THE DETERMINANTS OF CAPITAL STRUCTURE.

by

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CHAPTER I

INTRODUCTION

Subject

The decision to engage in business, expand business, or continue in business by replacing fixed assets is at the same time a decision to invest funds. Having made these corollary decisions, the owners or corporate managers are next faced with the selection of fund sources.

Regarding financial policy, practices and views held by corporations vary. Even so, basic trends can be seen. In general, companies prefer to finance from internal sources, but if they must use external financing, they show a preference for bonds over common stock.[1] Why, though, do some companies, even in the same business category, avoid debt while others find it attractive? One might expect these differences to be based upon recognized, widely accepted principles. Such a conclusion does not seem to be supported by evidence.[2]

Despite the lack of uniformity in corporation financial practice, it is not difficult to discover authorities who concede the importance of capital structure. According to John

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[1] J.B. Cohen and S.M. Robbins, The Financial Manager (New York: Harper & Row, 1966), p. 581.

[2] Ibid., pp. 578-581, passim.

Childs, capital structure is "the cornerstone of financial policy."[1] Ezra Solomon, expanding his idea of financial management, identified three basic questions requiring defensible answers by management; one of these was, "How should the funds required (by the firm) be financed?"[2] The financing of capital projects has been classified along with the selection of capital projects as one of the two most important and critical business decisions, reserved almost always to the judgment of top management.[3]

If, then, capital structure is important to the firm, requiring the decision of top management, it must be because the choice of fund source may affect the security, success, and hence the value of the corporation. The fact that even this basic idea is not totally agreed upon by scholars of finance provides some index of the complexity of contemporary literature regarding capital structure. Considerations such as stockholders' and debt holders' assessments of risk, their preference or aversion for risk, and their assessment of future company success based on varying degrees of knowledge represent a sampling of the factors which lead to a diversity of opinions among theorists on capital structure.

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[1]John F. Childs, Long-Term Financing (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1961), p. 7.

[2]Ezra Solomon, The Theory of Financial Management (New York: Columbia University Press, 1963), p. 8.

[3]A.J. Merrett and Allen Sykes, The Finance and Analysis of Capital Projects (New York: John Wiley & Sons, Inc., 1963), p. xi.

One idea underlying most theories on capital structure concerns the cost of capital to the firm. Though there is certainly little agreement on how this cost should be determined, there is conceded by many authorities to exist a relationship, however obscure, between capital cost and capital structure.[1]

Given the variety of conditions that may face a firm seeking capital, one model or simple set of principles seems unlikely to provide a totally acceptable approach to the problem. It does appear, however, that the application of mathematical analysis, coupled with empirical findings, and tempered by the caution of traditional wisdom may provide a rational avenue to corporate management for approaching capital structure questions. What is needed, it seems, are not more mathematical models (though greater statistical research might be helpful), but a framework within which to classify the body of existing knowledge.

A brief case was made earlier for the importance of capital structure decisions leading to their entrustment to top management. These decisions are inherently long-range ones. Even corporations utilizing no debt have indefinitely long-range commitments to their stockholders. Failure to admit this would virtually eliminate the going-concern assumption of accounting and force a valuation of the firm in question on a liquidation basis.[2] This long-range commitment inherent in capital structure decisions requires a system for problem solving that

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[1]Friedrich Lutz and Vera Lutz, The Theory of Investment of the Firm (Princeton: Princeton University Press, 1951), p. 193.

[2]Robert N. Anthony, Management Accounting (Homewood, Ill.: Irwin, Inc., 1964), p. 33.

gives proper weight to the varied factors involved. It is the optimistic goal of this study to extract from existing literature the more meaningful principles of capital structure development and place them into a useful context.

The Research Questions

The principal question of this paper is: What are the factors that should be considered in determining the capital source for investment? Subsidiary to the basic question are:

A. How may the cost of additional capital be determined?

B. What are the effects of dividend policy upon capital structure?

C. Is there a definable relationship between capital structure and capital cost?

Limitations

This study is primarily concerned with the quantifiable aspects of capital structure development as they may be determined from existing literature and available statistics. The principal criteria of capital structure management sometimes suggested are: Flexibility, Control, Cost, and Risk.[1] It is upon the cost element that this study will be focused. The existence of the non-quantifiable bases for decisions on corporate finance are

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[1]Edward J. Mock, et al. Financial Management: Text, Problems, and Cases (Scranton, Pa.: International Textbook Co., 1968), pp. 234-235.

recognized, and discussion of these factors will be included where it complements the central theme.

It is with larger corporations, whose equity and debt enjoy a ready market, that this study deals, though much of the material covered applies quite generally. In all cases, the investment decision is considered to be a given condition as is the need for funds. The only area of interest is that of source selection.

Long-term instruments will be the principal concern of the paper with short-term debt and credit being treated only briefly. Preferred stocks, convertible issues, and warrants will not be discussed nor will be the question of public versus private placement of debt.

The orientation of the study is primarily from the viewpoint of the owners or corporate managers. Of necessity, some mention of the analyst's approach, as well as that of the prospective stockholder, will be made but in a summary manner.

Methodology

The method of study used in this paper is based upon library research. The concepts and factors examined here are contained in a vast quantity of literature dealing with optimal financing decisions and written within the last twelve years. It is intended here to juxtapose the often conflicting, sometimes redundant models and principles into a coherent framework for analysis and evaluation of capital structure.

Organization

Chapter II describes the various sources normally employed by United States corporations in obtaining funds for investment. The descriptions are general but attempt to define the nature of these various sources, introducing some of the advantages and disadvantages which will be explored more fully in Chapters III and IV.

The basic factors leading to the selection or preference by corporations of particular fund sources are examined in Chapter III. Factors examined include determination by the firm of investors' risk assessment, dispersion of the probability distributions of the series of profits, the state of financial markets at the time when financing is needed, the attitudes or objectives of the particular firm's management and stockholders, and debt capacity determination.

Chapter IV presents and evaluates the more widely known analytical models which attempt to express in quantitative terms the effect of most of the factors of Chapter III upon the value of the corporation. Within this chapter is discussed the question of whether capital structure is a determinant of capital cost.

Chapter V summarizes the findings of the study and concludes the paper.

CHAPTER II

SOURCES OF CAPITAL

Equity

First in any consideration of corporate fund sources is equity. In a normal sense it is the one indispensable source. Under circumstances usually encountered, no one will supply all the funds required by an enterprise on fixed interest terms, with the expectation of only a moderate return if all goes well and possibly nothing if the enterprise fails.[1] For this reason primarily, the major part of long-term business finance exists in the form of equity capital. It is the nature of these funds that they are the final claimants to earnings. They can participate in earnings only after all creditors and other suppliers of funds have received their interest payments in full. Their position as last claimant makes the equity holders' risks the greatest of all the forms of capital. In a qualified sense, at least, this feature of risk makes equity capital the most expensive fund source.[2]

As described above, equity refers specifically to common stock. If common stock is the most expensive form of financing as suggested by Merrett and Sykes, why do firms utilize it? The

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[1] Merrett and Sykes, op. cit., p. 69.

[2] Ibid.

basic reason was provided above; equity is the base of the finance pyramid because other funds cannot normally be attracted without it.[1] When requiring further funds, newly organized firms may have no alternative than to employ more equity. The greater risks and uncertainties attending newer firms, coupled with their lack of reputation may make debt capital available only under most unfavorable terms.[2] Older firms, having reached a high ratio of debt to equity may again encounter excessive interest rates and/or restrictive conditions attached to debt. An expansion of the equity base may be an alternative in such instances. Conversely, a firm enjoying favor as a speculative issue may take advantage of a high price to earnings ratio to gain equity capital at a relatively inexpensive rate.[3]

Two features of equity act to deter corporate managements from unlimited use of common stock as a fund source. One is the introduction by new stock of additional voting shareholders, possibly holding views counter to management's or the original owners.[4] Second, as a deterring factor is the dilution of earnings which occurs when they are divided among more shares. Such dilution might reasonably be expected to affect share value. Though not supported by statistical evidence, the prevalence

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[1]Ivan R. Woods, "Financial 'Leverage' and 'Gearing' in Perspective," in Financial Decision-Making, ed. by Edward J. Mock (Scranton, Pa.: International Textbook Co., 1967), p. 527.

[2]Mock, et al., op. cit., p. 237.

[3]Cohen and Robbins, op. cit., p. 602.

[4]J.R. Lindsay and Arnold W. Sametz, Financial Management, An Analytical Approach (Homewood, Ill.: Irwin, 1967), p. 336.

of stock options among corporate managements has been proposed as creating an immediate aversion of these managements to diluting issues of new common.[1]

Given that the common shareholder incurs the maximum risk of fund suppliers, what then is his gain? The future income of the owner of shares in a publicly owned corporation has been reduced by Gordon to the following alternatives:[2]

1. Future earnings per share
2. Future dividends per share
3. The future dividends for a finite number of periods plus the price at the end of that time

Consideration of the shareholders' preferences for dividends now as opposed to capital appreciation or greater dividends later will be considered in the following chapter.

Retained Earnings

The equity of owners in a corporation is not, of course, limited to the value of their common stock. It is subject to increases or decreases through earnings or the pay out of dividends, respectively. The difference between total earnings to date and the total amount of dividends to date is retained earnings.[3] The retained earnings account is created and developed by transfer of

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[1]Cohen and Robbins, op. cit., p. 603.

[2]Myron J. Gordon, The Investment Financing and Valuation of the Corporation (Homewood, Ill.: Irwin, 1962), p. 43.

[3]Anthony, op. cit., p. 48.

the balance from the revenue and expense summary account.[1] Retained earnings are shown on the balance sheet.

Retained earnings deserve and normally receive separate treatment from common stock in questions regarding finance and capital structure. Unlike obtaining capital from a new equity issue, underwriting costs, and other administrative costs and nuisances are not encountered by management when retained earnings are employed as a fund source for investment. In fact, the use of these self-generated funds will not likely raise problems of stockholder consent or of control and interest.[2]

But the reference to retained earnings in the literature of capital structure and cost of capital frequently is not restricted to the narrow definition of these funds stated above. More normally the term, retained earnings, is given a broader meaning to encompass those funds accounted for under depreciation or depletion provisions. Depreciation and depletion, though not earnings are non-cash expenses. Depreciation and depletion allowances do not constitute net additions to the firm's total resources. Even so, funds accounted for under these allowances may permit changes in asset structure through reallocation.[3]

The treatment of internal funds is explicitly noted by some authors, for instance, Lutz and Lutz who state:

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[1]Ralph D. Kennedy and Frederick C. Kurtz, Introduction to Financial and Managerial Accounting (Scranton, Pa.: International Textbook Co., 1966), p. 427.

[2]Mock, et al., op. cit., p. 394.

[3]Ibid., p. 393.

> Our definition of the internal supply obviously does not coincide with what in business parlance has been referred to as 'retained earnings' after provision has been made for depreciation (and after dividends have been paid). We make no attempt here to draw a dividing line between depreciation and retained earnings...[1]

The same authors actually used the term internal supply of funds which they defined as the cash balances plus the total sum for which all the operating assets (and outside investments) could be sold.[2] Within this paper, retained earnings will be considered as the annual net earnings less dividends but augmented by depreciation and depletion allowances.

With the term established, it is apparent that the availability of retained earnings for reinvestment will be influenced by the firm's dividend policy. Bodenhorn observes that a firm could pay dividends equal to the net cash flows generated in any year. While, he admits, such a policy would result in dissolution of the firm, he maintains that, in principle, the decision to reinvest or to distribute to stockholders applies to the total net cash flow.[3] Though such extreme decisions as paying dividends from depreciation allowances are not common, the limited question of what per cent of profits to pay out is an important, universal problem of the successful firm.[4] The question is really one of

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[1]Lutz and Lutz, op. cit., p. 198.

[2]Ibid., p. 197.

[3]Diran Bodenhorn, "On the Problem of Capital Budgeting," The Journal of Finance, XIV (December, 1959), 489.

[4]Cohen and Robbins, op. cit., p. 552.

whether the stockholder is better off to receive dividends or to reinvest his equity in the firm in expectation of greater dividends later and/or appreciated value of his stock. What is really in the stockholders' best interest is usually recognized to depend upon: the stockholders' tax vulnerability, their preference or dependence upon an immediate income as opposed to a later one, and their preference or distaste for the cost and inconvenience of trading the stock. It is primarily the factor of differential tax rates that complicates the evaluation of retained earnings as an investment source. Tax effect varies with stockholders, from zero for some institutions to a very substantial per cent of income for certain individuals. It follows that lower income bracket investors who are dependent on investment income, as well as tax-exempt institutional investors would tend to prefer the cash income of dividends.[1] However rational an approach is used, some generalizations must be made about stockholders' tax susceptibility that do not hold for the entire population of stockholders.[2]

The extent of retained earnings use as a capital source is very significant. In 1961, internal funds accounted for approximately two-thirds of the total fund sources.[3] More recently this figure has been quoted as three-fifths of net new funds or four-fifths of all sources.[4] The largely constant ratio

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[1] Ibid., p. 42.

[2] Merrett and Sykes, op. cit., pp. 79-80.

[3] Cohen and Robbins, op. cit., p. 489.

[4] Mock, et al., op. cit., p. 393.

of debt to equity financing over the last several decades has been due not to common stock issues but to the commensurate increase of internal funds with debt.[1]

Long-Term Debt

Business firms, unlike consumers, are usually net borrowers; that is, the funds they require for operation and new investment normally exceed the funds generated internally as the sum of retained earnings and depreciation allowances.[2] Debt may take such forms as mortgage bonds, debentures, or long-term notes. It may, of course, take other forms, most of which fall into the general category of short term, which will be discussed later. But in whatever form debt is incurred, it is distinguished from other fund sources by the obligation it imposes upon the firm to pay interest and to repay the principal. In contrast, the common shareholder, regardless of his expectations upon investment, has no legal claim to dividends or fixed payment.[3] The claims of creditors to interest and repayment of principal are prior to claims of the equity holders. The default of this obligation can place the company in bankruptcy.[4] Firms whose structures include no debt may exhaust their funds through operating losses and poor investments, but the owners run no risk of bankruptcy

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[1]Lindsay and Sametz, op. cit., p. 344.

[2]Cohen and Robbins, op. cit., p. 487.

[3]Mock, et al., op. cit., p. 275.

[4]Childs, op. cit., p. 8.

unless some form of debt is incurred. In practice, the legal possibility of bankruptcy is nearly always present, since a company will always have at least some accounts payable. As debt rises, the risk of bankruptcy becomes greater, until a point is reached where the risk is substantial.[1]

The aspect of risk introduced solely by borrowing has been the subject of much study. The term financial risk is frequently used to distinguish it from business risk inherent in the physical operations of any firm, namely the inability to insure absolutely stable sales, costs, and profits. Borrowing imposes the obligations of interest payment and principal repayment, aspects of financial risk. But additionally, to the extent which borrowing is used, the fluctuations of annual net cash flow available for payment of dividends or reinvestment will be greater as a proportion of the stockholders' investment.[2] In other words, the risk to stockholders that they will receive neither dividends nor capital appreciation is increased by borrowing. Barges has summarized financial risk most succinctly as follows: "The expected average income for shareholders will be subject to a greater degree of risk than the income from assets of the firm."[3]

Yet another disadvantage of debt is the loss of flexibility that may attend its use. Flexibility here is considered to be

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[1]Harold Bierman, Jr. and Seymour Smidt, The Capital Budgeting Decision (New York: The Macmillan Co., 1964), p. 158.

[2]Alexander Robichek and Stewart C. Myers, Optimal Financing Decisions (Englewood Cliffs, N.J.: Prentice Hall, Inc., 1965), p. 17.

[3]Alexander Barges, The Effect of Capital Structure on the Cost of Capital (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1963), p. 18.

management's ability to alter the firm's capital structure when desirable.[1] Examples of flexibility loss include rigid requirements for sinking fund payments and limitations on dividend payments; either or both of which may be incurred with bond indentures.[2] Compensating balances, which are usually required, are a further limitation on flexibility, though they are principally a feature of short- or intermediate-term debt.[3]

With the seemingly formidable disadvantages of debt, why then is it a major fund source? The opening statement of this section regarding businesses as net borrowers does not completely answer the question; presumably, firms faced with capital demand beyond their internal resources could sell new equity. The answer lies in the strong, off-setting advantages debt has vis-a-vis equity, under certain circumstances. The purpose of raising debt capital is frequently to provide finance on terms cheaper than those required by equity shareholders. The firm is actually selling a portion of its income as a prior charge to the debt holders in return for a capital sum. This sum is usually secured as a fixed or floating charge on the firm's assets. For this arrangement to be profitable to the equity shareholders, it must be that the debt holders are prepared to pay more for this amount and quality of income than it is worth to the equity

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[1]Mock, et al., op. cit., p. 234.

[2]Cohen and Robbins, op. cit., p. 595.

[3]Jack M. Guttentag and Richard G. Davis, "Compensating Balances," in Financial Decision-Making, ed. by Mock, op. cit., p. 653.

shareholders.[1] This concept that borrowed capital is cheaper than equity capital has introduced into business literature the term "trading on the equity," sometimes referred to as "leverage" and, less frequently in the United States of America, as "gearing." These terms may be simply defined as the ability of a business to obtain low-cost borrowed capital and use it productively to obtain a higher return with the differential going to the benefit of the owners.[2] The test of the validity of "trading on the equity" as a concept is basic to theories underlying optimal capital structures.[3] Table 1 illustrates the effects upon earnings per share due to financial leverage.

Conditions beyond the firm and its creditors operate to create a bias in favor of debt. Foremost of these conditions is the existence of a tax on corporate earnings, favoring debt, in that interest payments are deductible as an expense. The advantage is evident for even moderate-sized corporations whose tax rate approximates 52 per cent.[4] Table 1 on page 17 suggests the favorable effect of tax law upon interest cost, using a 48 per cent rate. Second is the advantage debt enjoys during periods of inflation and anticipated inflation. The interest charge of old debt remains fixed while costs of equity (and new debt) rise.

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[1]Merrett and Sykes, op. cit., p. 393.

[2]Woods, "Financial 'Leverage' and 'Gearing' in Perspective", op. cit., p. 525.

[3]Robichek and Myers, op. cit., p. 21.

[4]Merrett and Sykes, op. cit., p. 408.

TABLE I

SOURCES OF FUNDS

	A	B	C
5% Bonds	$ 400,000	$ 200,000	$ 0
Common Stock	600,000	800,000	1,000,000
No. of Shares	6,000	8,000	10,000
Total	$1,000,000	$1,000,000	$1,000,000

EARNINGS PER SHARE

Earnings before interest and taxes	$ 30,000		$ 30,000		$ 30,000	
Bond Interest	20,000		10,000		0	
Earnings before taxes	$ 10,000		$ 20,000		$ 30,000	
Income taxes (48%)	4,800		9,600		14,400	
Earnings after taxes	$ 5,200		$ 10,400		$ 15,600	
Earnings per share	5,200	= $.87	10,400	= $1.30	15,600	= $1.5
No. of Shares	6,000		8,000		10,000	
Earnings before interest and taxes	$ 60,000		$ 60,000		$ 60,000	
Bond Interest	20,000		10,000		0	
Earnings before taxes	$ 40,000		$ 50,000		$ 60,000	
Income taxes (48%)	19,200		24,000		28.800	
Earnings after taxes	$ 20,800		$ 26,000		$ 31,200	
Earnings per share	20,800	= $3.47	26,000	= $3.25	31,200	= $3.1
No. of Shares	6,000		8,000		10,000	
Percentage increase, EBIT	100%		100%		100%	
Percentage increase, EBT and earnings per share	300%		150%		100%	

Source: Robert W. Johnson, Financial Management (Boston: Allyn and Bacon, Inc., 1966), p. 249.

Barges has observed,

> ...it seems reasonably certain that if inflation is the expectation, the potential dollar gains--as well as real gains--of levered stocks are greater than potential losses and greater than the potential dollar gains of unlevered stocks.[1]

He goes on to note that inflation and inflationary sentiment have been important in the American economy since 1945.[2] The inflationary situation certainly continues as of this writing.[3]

Without providing a general theory of capital structure, it can be shown that certain factors limit the adherents of the "cheap debt" concept in their use of debt. Availability is an important limiting factor as is a rising, explicit cost of debt (interest rate) as more borrowed funds are used. The activities of the rating agencies, Moody's Investors Service, Standard and Poor's Corporation and Fitch Investor's Service, affect the debt servicing cost to be encountered by the borrower. While the ratings are not exact guides to quality and are not based upon a mathematical approach, they are widely accepted by investors. Very recently a spokesman for the Virginia Electric and Power Company stated that the firm traditionally tried to keep its percentage of capital from bonds approximately 55 per cent. He said, "We can't stray too far off the 55 per cent or we might jeopardize the company's AA bond rating."[4] The financial

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[1]Barges, op. cit., p. 98.

[2]Ibid., p. 99.

[3]Hobart Rowan, "All Won't Be Solved by Balanced Budget," Washington Post, January 25, 1970, Sec. E, p. 1.

[4]Robert J. Samuelson, "VEPCO to Raise Capital to Finance Expansion," Washington Post, November 9, 1969, Sec. B, p. 1.

community's evaluation of risks, earnings, and dividends which theoreticians attempt to quantify, are undoubtedly heavily influenced by these rating agencies.[1]

Short-Term Debt

Though the foregoing discussion has been oriented toward debt raised through long-term securities, most of the observations apply as well to short- and intermediate-term debt. Eli Schwartz has commented upon finance literature's exclusion of non-security type debt from capital structure. He states that the exclusion is arbitrary, that it implies that the borrowers' risk is greater with fixed debt than with current account, and that it ignores the substantial interchangeability existing between the various forms of external debt.[2] It has been recently acknowledged that short-term debt's effect on leverage may be the same as that of long-term debt, although the former's existence is more transitory.[3]

Professor Schwartz's position seems strengthened in view of the fact that the use of short-term and non-security type debt has risen abruptly in recent years. As an example, commercial paper alone reached a volume of $19 billion in May of 1968, triple its volume of 1963.[4] The trend has continued with commercial

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[1]Childs, op. cit., pp. 11-12.

[2]Eli Schwartz, "Theory of the Capital Structure of the Firm," Journal of Finance, XIV (March, 1959), 19.

[3]Johnson, op. cit., p. 249.

[4]"More Companies Borrow Direct," Business Week, May 18, 1968, p. 80.

paper volume reaching $23.7 billion in March of 1969, approximately one-third as high as the value of all the nation's prime bank loans.[1] The interchangeability of debt sources suggested by Schwartz is explored quantitatively by Robichek and Myers (hereinafter referred to as RM), including as alternatives:[2]

unsecured lines of credit

pledges of accounts receivable

discount forfeitures (stretching of accounts payable)

term loans

The list might equally as well have included trade acceptances and commercial paper.[3]

Because not all theories or works are so all-embracing as those of Schwartz or RM, the term capital structure will be defined, where necessary, as to the funds included.

Summary

This chapter has described the more usual sources of capital employed by United States corporations; it specifically ignores, however, preferred stock and convertible issues.

Each of the several sources, common stock, retained earnings, long-term debt, and short-term debt are found to possess certain advantages, attended by inherent limitations. Common stock

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[1] "The Great Corporate Capital Hunt," Fortune, May, 1969, pp. 33-34.

[2] Robichek and Myers, op. cit., p. 113.

[3] Cohen and Robbins, op. cit., pp. 367-372.

is determined to be a necessary foundation of the capital structure. Its use for subsequent expansion is found to be constrained by the apparent high cost of this fund source and by the possible aversion of managements and owners to dilution of earnings.

Retained earnings, serving to build the equity base of the structure, are determined to be relatively inexpensive on superficial examination due to the absence of flotation cost. With further analysis this source is discovered to have a cost to the owners through their foregoing of dividends. As a result, the use of retained earnings is considered to be a function of dividend policy which in turn is found to be influenced by income tax, among other things. The term, retained earnings, is defined to include the non-cash expenses, depreciation and depletion.

In studying debt, it is revealed that this fund source introduces the hazard of bankruptcy as well as the risk of interruption of cash flows available for dividends or reinvestment. The concept of financial risk as distinct from business risk is discussed. The disadvantages of risk are determined to be offset, partially at least, by the deductibility of interest expenses from taxable income. The use of debt is considered to be limited due to its rising explicit cost (interest) with increased use, its occasionally restricted availability, and its probable adverse effect upon common share valuation.

CHAPTER III

FACTORS WHICH INFLUENCE THE SELECTION OF CAPITAL SOURCES

The Objectives of the Firm

Without a common reference against which to measure, it is not possible to evaluate the various approaches to the fund source selection problem. Lacking an objective, there is no criterion by which to measure the effect of proposed courses of action.[1] Depending upon whose welfare the firm seeks to benefit the optimal approach may take many forms. An examination of the possibilities will then be made first.

One of the most categorical statements on objective has been made by Childs. It is, he says, the owners' or stockholders' long-run economic benefit that financial managers should seek to maximize.[2] Bierman and Smidt, without defining what *should* be, observe that it is a conventionally adopted principle that the corporation seeks to maximize the economic well-being of its present stockholders.[3] The two foregoing positions, though very similar, admit some possibility for conflicting decisions.

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[1]James T.S. Porterfield, *Investment Decisions and Capital Costs* (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1965), p. 11.

[2]Childs, *op. cit.*, p. 4.

[3]Bierman and Smidt, *op. cit.*, p. 141.

Present stockholders may be traders, desiring a quick appreciation of market value without regard for long-range results. Such owners might be ill-served by Mr. Child's management concepts. Both authorities at least agree on maximizing the wealth of common shareholders, though as a group those owners may have heterogeneous goals. The definition of what is meant by wealth maximization is clearly stated by Diran Bodenhorn. He says it is the difference between the owners' equity in the firm and their investment in the firm.[1] More shall be said later of how these elements are valued. The bases for the wealth maximization criterion have been summarized rather exhaustively by Porterfield as follows:[2]

(1) The principle proclaimed by Adam Smith that every individual (in this case firm), in pursuing its own selfish good, is led to achieve the best good for all still underlies the philosophy of the free enterprise economic system.

(2) In many instances, pursuing the welfare of other publics (community, general public, government) is a means to the end of maximizing owner's welfare. In other words, differently stated objectives often clothe the basic objective of wealth maximization.

(3) Management is responsible to the owners, whose creature it is. Although in practice the connection between ownership and control is often a tenuous one, the management that persistently fails to seek the welfare of the owners is subject to replacement.

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[1]Bodenhorn, op. cit., p. 474.

[2]Porterfield, op. cit., p. 12.

(4) Even if the firm should decide to pursue goals other than its owners' welfare, it should at least be concerned with how much this pursuit is costing the owners.

(5) A single explicit objective for the firm is vastly superior to an ill-defined complex of goals. The latter would make financial decision-making even more difficult than otherwise.

For the reasons advanced above, as well as for the reason that most theorists adopt the same objective, it is considered here that the maximization of wealth for the common stockholder is the basic, underlying objective of management in decisions regarding fund sources. In practical applications, however, both management and investors should be aware that departures from even this broad objective exist. Corporate managements frequently have goals that conflict with the economic well-being, short-run or long-run, of the common shareholders. Examples of interest conflicts within management include a desire: to see the corporate organization expand (without regard to stockholder return); to insure that its own tenure and ability to choose its successors is not threatened; and to extend or at least maintain the realm in which it is free to make decisions for the organization without reference to outside groups.[1] A management whose chief aim is to stay in office may avoid the use of debt solely to insure more stable earnings and dividends, even though potential profits are forfeited in so doing.[2] These considerations may cause

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[1]Bierman and Smidt, op. cit., pp. 141-142.

[2]F. Modigliani and M.H. Miller, "The Cost of Capital Corporation Finance, and the Theory of Investment," The Economic Review, XLVIII (June, 1958), 249.

management to prefer a simple capital structure, even at the expense of the shareholder in order to minimize challenges to management's control.[1] Similarly, desire for expansion may lead management to employ retained earnings for projects less beneficial to stockholders than would be dividends.

Having accepted the maximization of shareholder wealth as the principal objective of the firm, substantial further assumptions need definition and will be treated in connection with various theories. These assumptions involve the means of measuring the shareholders' wealth.

Risk

At this stage, the sources of capital under consideration may be grouped into two, all-inclusive categories, debt and equity. The former includes all the various interchangeable forms ranging from trade credit to bonds; and the latter includes stock, both common and preferred (the latter will be ignored herein), and all internally generated funds. The reason for the question of choice between these two sources rests mainly upon the existence of risk. Under conditions of certainty and perfect markets there is no difference between debt and equity. The problem of debt as a substitute for equity arises only with the occasion of uncertainty.[2] The risk problem has two sides. From the standpoint of the investor, debt offers relatively certain income streams (interest) because of debt holders' prior claim on earnings discussed

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[1] Lindsay and Sametz, op. cit., p. 336.

[2] Robichek and Myers, op. cit., p. 21.

earlier. For the same reasons, the prospective common stock investor must view income from equity as less certain. When the viewpoint is reversed to be that of management, debt and equity reverse their roles with regard to risk, i.e., debt is the more risky.[1] It would seem then that corporate management must consider its own risk preferences and attempt to anticipate those of investors. This effort will bring management into what Ross G. Walker speaks of as "the almost inpenetrable mists of any forecast."[2]

The classification of risk into business and financial categories was presented earlier. While business risk appears to have a definite role in capital structure, this role will be discussed later. The concern here is with financial risk as a function of leverage and how this risk is perceived by the investor. A graphic portrayal of the financial risk concept is provided by Barges and reproduced below as Figure 1. Curve A represents the probability distribution of average income from assets of two firms. The one curve for both firms assumes an identical distribution and risk class for each firm. Firm A employs no debt. Curve B, while still identical to A, is shifted downward, representing debt in firm B's structure. This debt requires $4,000 servicing cost annually, the magnitude of the vertical displacement of B. While both curves have the same absolute range ($10,000), the dispersion relative to expected income is much greater for B than for A ($\frac{10,000}{6,000}$ vs. $\frac{10,000}{10,000}$).

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[1] See supra, pp. 14-15 for a discussion of this point.

[2] Ross G. Walker, "The Judgment Factor in Investment Decisions," Harvard Business Review, Mar. - Apr., 1961, p. 99.

This relatively greater dispersion is due to leverage (use of debt) and constitutes the financial risk of firm B. The aspect of financial risk just described is substantially uncontroversial among current authorities.[1]

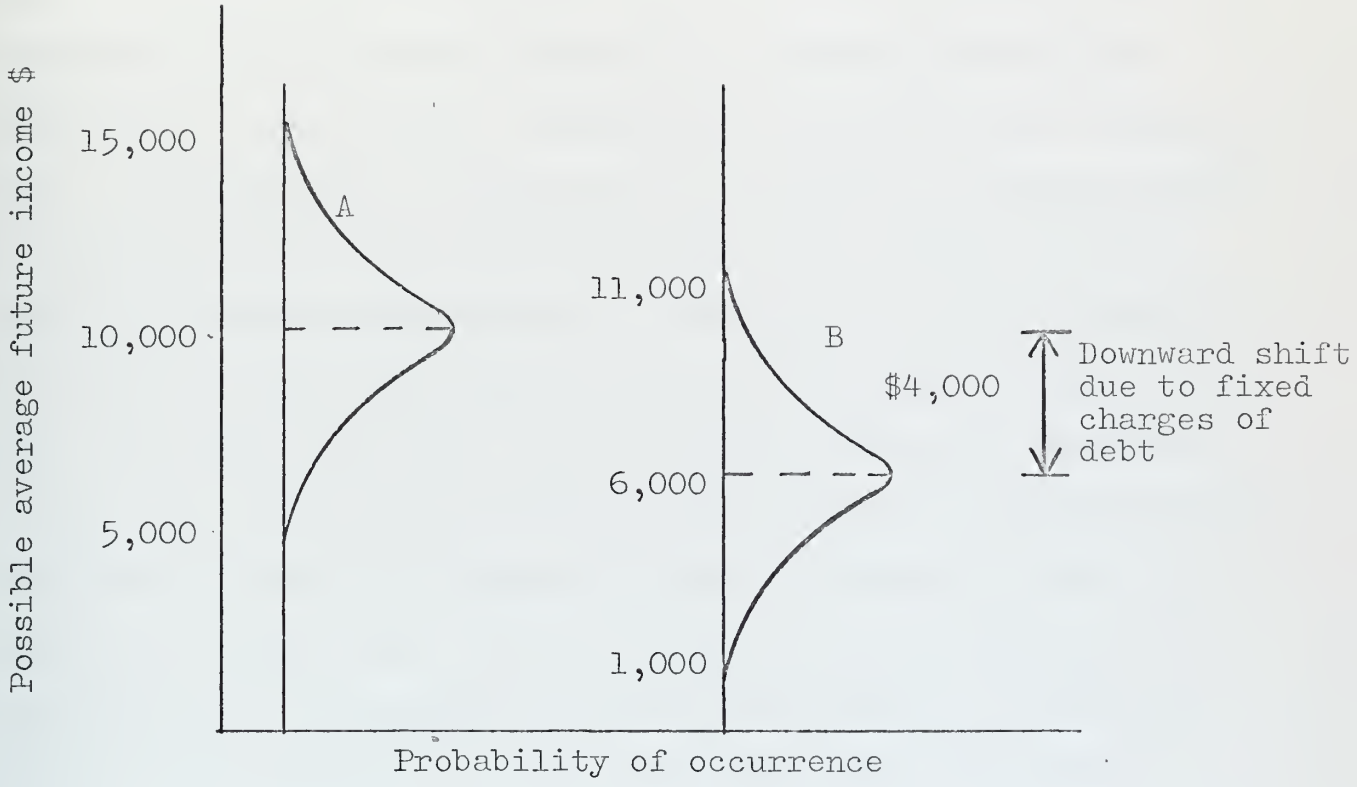

Figure 1. Effect of debt upon probable income. After Barges, op. cit., p. 19.

RM have described risk aversion in this manner, "A person is averse to risk in a given situation if, given the choice between two returns with the same expected monetary value, he chooses the alternative with the less risk, risk being defined for the time being, as some function of the dispersion of the subjective probability distributions of the expected returns."

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[1]James C.T. Mao, Quantitative Analysis of Financial Decisions (London: Collier-Macmillan, Ltd., 1969), p. 416.

These same authors go on to observe that the assumption of risk aversion is a common one for many writers on capital cost who agree on little else.[1] As a means of demonstrating the existence of risk aversion, RM use the assumption of a utility function. That is, they assume a mythical Mr. X can consistently express his preferences as to various values of M, monetary value to be received in a given year. Assuming his preferences are expressed by U = f (M), where U is utility as a function of monetary value, a curve could be plotted of utility (on the ordinate) versus monetary value (on the abcissa). Using the familiar economist's principle of declining marginal utility, it would be expected that the curve would have a positive but continually declining slope, i.e., approaching some limiting value of U asymptotically.[2] With such a curve, the expected change in utility for Mr. X, given an even bet (the toss of a fair coin), would always be negative since the negative possibility would act on the more steeply sloping portion of the curve than would the positive possibility. More simply, the monetary value of winning corresponds to less incremental utility than does an equal monetary loss.[3] Even so, the observable fact that some persons gamble often and all persons gamble sometimes, of necessity, destroys the universality of the preceeding exercise as a proof of risk aversion.

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[1]Robichek and Myers, op. cit., p. 69.

[2]Paul A. Samuelson, Economics, An Introductory Analysis (New York: McGraw-Hill Book Co., 1967), p. 417.

[3]Robichek and Myers, op. cit., p. 70.

With the ambiguity of risk as a concept in mind, it is possible to identify three broad factors which determine the riskiness of a stock to an investor: (a) the dispersion of the subjective probability distribution assigned to expected dividends, (b) the form of this distribution, and (c) the extent to which random variations in the dividends are correlated with the variations in returns of other investment opportunities.[1] The first two factors exist because an infinite number of probability distributions may have identical means and standard deviations, yet be quite different in form. Thus an investor who can ill-afford loss would choose the investment with the least dispersion and the least area under the probability curve on the low or negative side.[2] The third factor is exemplified by the alternate choices of a $1,000 bet on one flip of a fair coin or ten bets of $100 each on ten separate flips of a fair coin. It is presumed the rational, risk-averting investor would choose the latter due to the probable cancelling effect. Even using these three factors as guides, it could reasonably be anticipated that investors might have different expectations regarding the performance of a given firm. These could vary because: differing quantities and qualities of information are available to different investors; investors vary in their evaluation of identical data; investors have unlike attitudes toward risk; and some investors may expect "irrational" behavior on the part of others.[3] Again it is important to note

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[1] Ibid., p. 79.

[2] Ibid., pp. 77-78.

[3] Ibid., p. 17.

that the expectation of the investor is the question, not an absolute determination of how the firm will perform.

The risk under review here is exemplified in a simple form by the application of probabilities. Suppose that an investor is considering two alternative investments; twenty shares of a stock or one bond, either investment requiring $1,000 and having a nominal time range of ten years. The eventualities, as perceived by the investor, are given in Table 2. An arbitrary 5 per cent opportunity cost factor is used to discount the income streams and terminal values to present value. The mean realizations for both investments are nearly identical (approximately $231). The most probable realization for the stock, however, is over twice that of the bond ($462 versus $194), but is attended by significantly greater risks of absolute loss (44 per cent probability for the stock, 2 per cent probability for the bond). Even in this simplified situation, the response of the risk averting investor is not wholly evident. Using the definition of RM given earlier, though, it is assumed by this writer that the investor would choose Investment B (the bond) as the dispersion of the outcomes is far smaller than for the stock. Where a substantial loss might mean bankruptcy or severe hardship, the likelihood of the bond being chosen is increased. This does not preclude the possibility that many investors may place more weight upon the "most probable outcome," ignoring or demoting the importance of dispersion and altering the selection to Investment A. It has been proposed that the investor is constrained to use crude

TABLE 2

INVESTMENT A, 20 SHARES OF

COMMON STOCK @ $50 = $1000

Dividend over past year has been $4/share

Eventualities	Present Value (Discounted @ 5%)	Gain (Present Value less Investment)	Subjective Probability (Assigned by Investors)	Weighted Realization
	$			$
(1) Dividend constant @ $4 for 10 years; market value in 10 years - $50	1232	232	.16	37.12
(2) Dividend constant @ $8 for 10 years; market value in 10 years - $75	2156	1156	.40	462.40
(3) Dividend constant @ $2 for 10 years; market value in 10 years - $25	616	- 384	.22	- 84.48
(4) Dividend constant @ $1 for 5 years; market value in 10 years - $5 (liquidation)	165	- 835	.22	-183.70
		MEAN REALIZATION		+231.34

Source: An adaptation of work by Merrett and Sykes, op. cit., pp. 182-183.

TABLE 2 continued

INVESTMENT B, ONE BOND @ $1000

INTEREST RATE 8%

Eventualities	Present Value (Discounted @ 5%)	Gain (Present Value less Investment)	Subjective Probability (Assigned by Investors)	Weighted Realization
	$			$
(1) Payments met for 10 years, face value @ 10 years	1231	231	.84	194.04
(2) Payments met for 5 years, sell bond @ 5 years for $1250	1326	326	.12	45.64
(3) Payments met for 5 years, default, repays $250	542	-458	.02	- 9.16
		MEAN REALIZATION		+230.52

methods in his risk analysis and bases his decision principally upon the most probable value, allowing for reductions in that value by one of several adjustments.[1]

A further obstacle to predicting investor reaction is that subjective probabilities as employed in the foregoing analysis are not objectively verifiable. They will vary with different persons and even with time.[2] It is not the firm's performance that management needs to predict in this capital fund source analysis, but rather the investors' reaction to real or imagined risks that may be injected into the firm's earnings and/or dividend streams by increased borrowing.

A useful introduction to possible effects upon common shareholders' wealth caused by risk evaluation is provided by Lindsay and Sametz.[3] They propose the idea that when stockholders feel that the chance of unusual profits or losses is no longer offset by the higher average return they can receive, they will view further debt issues unfavorably. In other words, they will capitalize the probable average earnings at a higher rate to account for the increased risks of incurring additional fixed charges and the accompanying increased variability of net earnings per share of stock. This behavior by stockholders (current and prospective) would prevent the probable increased average earnings from increasing the value of the stock in the marketplace. The idea seems clearly related to the principle of evaluating dispersions of income discussed on page 26.

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[1] Lutz and Lutz, op. cit., p. 192.

[2] Merrett and Sykes, op. cit., p. 184.

[3] Lindsay and Sametz, op. cit., p. 294.

The same writers take yet another approach to highlight the role of risk through leverage effect on stockholder wealth. In this approach it is considered that the risk introduced by borrowing funds is added to the cost of equity funds rather than to the cost of debt. The latter is then measured only by out-of-pocket interest cost.[1] This approach, they argue, keeps uncertainty and risk concerned with dispersion around the most profitable outcome analytically distinct from the additional risk injected solely by using fixed-charge finance.[2] The optimal combination of debt and equity will be at the point of minimal average cost. An example of this method follows and is summarized in Table 3. A company with a capital structure of equity only has an annual earnings stream of $1,000, capitalized by the stock market at 10 per cent. Stockholders' wealth is then $10,000 (assuming 100 shares are outstanding, the per share market price is $100).[3] The company is faced with a $10,000 investment opportunity that promises another $1,000 annual returns stream of exactly the same business risk as the firm's going investment. If the interest rate at which the firm could borrow the needed $10,000 were 5 per cent, is it advantageous to borrow the funds or to raise them by selling additional shares of stock?

The solution in this example will be wholly determined by the assessment it is assumed that the stockmarket will make of

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[1] Ibid., p. 295.

[2] Ibid., p. 238.

[3] Note the conflict with Bodenhorn's definition of owners' wealth. The two can be nearly reconciled except for consideration of initial investment. (See supra, p. 21.)

the additional risk injected into the equity earnings stream by borrowing (raising the Debt/Equity ratio). It is assumed here to be unlikely that the market will capitalize the $1,500 probable annual return ($1,000 + $1,000 - $500 interest) at the original 10 per cent. As the authors point out, if the interest rate did not rise with leverage, debt would be limitless. This ignores certain other factors, of course, but is adequate for illustration. The example shows two possibilities, that the capitalization rate will rise from 0.10 to either 0.12 or 0.15; that is, the Price/Earnings ratio will decline from 10 to 8 1/3 or 6 2/3.

TABLE 3

THE EFFECT OF FINANCIAL LEVERAGE UPON SHARE VALUE

	Increasing the Equity	Trading on the Equity		
	Column 1	Column 2		Column 3
Expected earnings after tax	$ 2,000	$ 2,000		$ 2,000
Debt			$10,000	
Interest			0.05	
Interest cost			500	
Earnings on equity	$ 2,000	$ 1,500		$ 1,500
Capitalization rate	0.10	0.12		0.15
Capitalized (market value of equity)	$20,000	$12,500		$10,000
Number of shares	200	100		100
Price per share	$ 100	$ 125		$ 100

Source: Lindsay and Sametz, op. cit., p. 296.

In the example, the assumption of a 0.12 capitalization rate leads to accepting the debt alternative since the market value of the stock is raised to $125 as opposed to the equity alternative resulting in a value of $100 per share. The assumption of a

capitalization rate of 0.15 leaves the problem to be solved by other factors (possibly non-quantitative) as the stock values for both the debt and the equity sources are identical. It could be equally well shown that by assuming a greater capitalization for the risk of leverage, the advantage could go to the equity option. In either event, management's problem is to second guess the market's reaction to increased financial risk.

It is with regard to the effect of risk that a schism exists in theories regarding capital cost behavior under varying conditions of leverage. The traditionalist view is that although the Earnings/Price: Interest Ratio is constant, thus providing the same proportional gain from borrowing within wide ranges of Debt/Equity, the risk element increases more than linearly with rises in the Debt/Equity Ratio.[1]

In later mathematical approaches to the optimal financing problem, an attempt will be demonstrated of determining a certainty equivalent of expected dividends. The concept is that there exists some factor, $\underline{a}_t$, such that a risk-averting investor is indifferent between an expected dividend, $\overline{D}_t$, and a dividend D_t^*, where

$$D_t^* = \underline{a}\overline{D}_t$$

The factor $\underline{a}_t$ will have values

$$0 \leq \underline{a}_t \leq 1$$

and D_t^* will represent a certain income, perhaps from government securities.[2]

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[1] Lindsay and Sametz, op. cit., p. 297.

[2] Robichek and Myers, op. cit., pp. 80-81.

Regardless of the positions taken regarding it, risk is central to almost all of the principal works dealing with capital structure. Of those references in the bibliography of this study, none which deals specifically with capital structure fails to identify risk as a factor of such structure.

Stability of Earnings

It follows in a general way that industries which enjoy inherently stable earnings streams will likewise incur lower dispersion of incomes. Based on the discussion of risk aversion in the preceding section, it would seem reasonable that investors would find financial risk more acceptable in stable-earnings firms than in those whose profits are subject to wide and frequent swings. Such an idea is explicitly stated by at least one writer.[1] In fact, many authorities make reference to the stability of earnings as a principal determinant of capital structure. Lutz and Lutz list this as first among six factors saying, "In general it will be true that in industries where the dispersion of expected gross profits is relatively low, there will be a greater tendency to finance by bonds than in industries where it is high."[2] Eli Schwartz identified the stability of earnings as part of the external risk of the firm, a term synonomous with what has hereinbefore been defined as business risk.[3] Yet another author indirectly supports earnings

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[1] Johnson, op. cit., p. 251.

[2] Lutz and Lutz, op. cit., p. 202.

[3] Schwartz, op. cit., p. 20.

stability as a major factor by saying that railroads, while having heavy investments in fixed capital, relative to working capital, are limited in their use of debt by wide fluctuations in their earnings.[1] The implication of the foregoing statement is that debt in the railroad industry, though very high, would be even higher without the instability of earnings. The regulated electric utilities best characterize the stable-earnings firms discussed here.[2] Their capital structures typically include extensive funded debt; until the past decade these firms dominated the long-term debt market.[3] During the depression years between 1927 and 1933, the earnings of public utilities (excluding railroads) dropped 10 per cent in contrast to a 68 per cent decline for industrials.[4] Early in the 1960s, the public utilities (not just electrical) as a group had capital structures financed approximately 30 per cent from long-term debt. Only the construction and service industries exceeded public utilities in liability financing, each of the two former, however, with significantly lower percentages in long-term debt.[5]

The requirement of earnings stability as a prerequisite to long-term debt may be approached in a different way, namely as a problem in cash flow management. For example, firms subject to wide seasonal variations may well find their incomes unable to

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[1]Mock, et al., op. cit., p. 238.

[2]Childs, op. cit., p. 12.

[3]Lindsay and Sametz, op. cit., p. 364.

[4]Reuben F. Slesinger and Asher Isaacs, Business Government, and Public Policy (Princeton, N.J.: Van Nostrand Co., Inc., 1968), p. 296.

[5]Johnson, op. cit., p. 238.

meet high fixed debt obligations in all of the four quarters. Debt, if used by them, must be of a short-term nature. The retail department stores and manufacturers of toys, fertilizers, and women's clothes belong to the seasonal income category. While not eliminated from the long-term debt market, such firms are characterized by low percentages of long-term debt.[1] In a similar manner, the durable goods producers, affected strongly by national income level changes, are subject to longer term cyclic variations in earnings. Though business cycles affect the entire economy, the high income elastic products experience more jeopardy to their earnings in times of recessions than do the producers of low-cost items or nondurable consumer goods (foods). The machine tool industry is an example of the extreme cyclical variation in sales. The nature of the product--a durable capital good of relatively high unit value--is such that it reflects high income elasticity. Companies in this industry have experienced a series of periods of sharp and prolonged contractions of income with annual sales reduced to 20 per cent of previous peak years.[2] Not only might these durable goods firms face possible default, but their borrowed funds may lie fallow for want of acceptable investment opportunities during depressed periods. The multiple adverse effects of financial leverage upon the residual owners creates an aversion to long-term debt in such industries.[3]

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[1] Ibid., p. 242.

[2] Gordon Donaldson, Corporate Debt Capacity (Boston: Harvard University, 1961), p. 16.

[3] Johnson, op. cit., p. 261.

Regulation

Of the possible external influences upon capital structure, regulation is perhaps the most absolute. Furthermore, the regulated industries include some firms (public utilities) whose stable earnings characteristics encourage a diverse capital structure. Those utilities affected by the Securities Exchange Commission have been influenced by that agency to limit long-term debt to 50 per cent of their capital structure, in general. Regulatory bodies have likewise constrained the railroads, though to a much smaller debt percentage.[1]

Stage in Life Cycle

Previously, under the discussion of equity on page 8, the effect of firm development was presented as a factor in the demand for capital and in the selection of source. It is considered sufficient here to repeat stage of life as a consideration in capital structure development.

Debt Capacity

While discussing risk as a factor, the point was made that management must consider the assessment of the investor and management's own risk preferences in making capital structure decisions. One aspect of this problem-solving procedure would seem to be a determination by management of how much debt the firm can carry within the parameters of risk established. It is

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[1] Ibid.

not inconceivable to this writer that the debt decision based solely upon an assessment of investor reaction might be on the dangerous side from the point of view of management. The rationale for including debt capacity as a factor is predetermined by the assumption that management seeks to serve the residual owners' welfare; hence the prudent manager would not needlessly hazard bankruptcy. But the question encountered is, how to make explicit the assumptions or feelings of management toward debt.

Gordon Donaldson has proposed a method to be used by corporate mangers in resolving for themselves the question of debt capacity. His method involves not an evaluation of debt effect upon corporate value but rather a rational assessment of financial risk and business risk. He refers to the then current (1962) practice in management of debt decisions as a relatively "crude art." Donaldson observed that frequently one of the following courses was used in reaching a decision on debt capacity:

1. Seeking the counsel of institutional lenders or financial intermediaries.
2. Taking notice of what comparable companies were doing in this area of financial management and following them.
3. Following past practices for the firm.
4. Referring to the obscure authority of "general practice."

Donaldson went on to point out that even the accepted rules for debt capacity are inadequate. The first of these rules he cited

as the earnings coverage ratio, "that ratio of net income available for debt servicing to the total amount of annual interest plus sinking fund charges." The inadequacy of this criterion, he noted, is that net earnings on the income statement are not the same thing as net cash inflow--an assumption implicit in the earnings coverage standard. As an example, during a recession, earnings may remain up for a period, but accounts receivable may experience an incidence of bad accounts far above normal and hence produce less cash.[1] It is the cash that is needed for the fixed charges of debt.

As a second inadequate but existing rule, Donaldson listed the capitalization standard. This standard involves setting the debt limit at some percentage of the total capitalization. The limitation of this rule, he said, arises from the wide variation in relation between the principal of the debt and the annual obligation for cash payments under the debt contract. In industrial companies for instance, the principal of the debt may be repaid serially over the life of the debt contract, which may vary from ten years or less to thirty years or more. The annual cash outflow associated with $10 million debt on the balance sheet may then, for example, vary from $500,000 (interest only at 5 per cent) to $833,000 (interest plus principal repayable over thirty years) to $1,500,000 (interest plus principal repayable over ten years).[2] Evidence that this measure is still in use is abundant.[3]

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[1]Gordon Donaldson, "New Framework for Corporate Debt Policy," Harvard Business Review, March-April, 1962, pp. 119-122.

[2]Ibid., p. 122.

[3]Glenn R. Miller, "Corporate Financing in the Present Money Market," The Financial Executive, July, 1968, p. 47.

Having exposed the weaknesses of commonly accepted standards, Donaldson stated his own concept of the basic question in the determination of the magnitude of risk associated with long-term debt as: "What are the chances of the business running out of cash in the foreseeable future?" and "How are these chances changed by the addition of X,000's of dollars of annual interest and sinking fund payments?" The steps proposed by him are:

1. Identify the primary factors which produce major changes in cash flow.
2. Observe the individual behavior of these factors over time and in particular during recessions (using company records, if available). The detailed assessment of key factors is intended to minimize the inadequacy of historical experience. The observation of these factors is used to suggest a range of recession behavior which describes the maximum favorable limit and the maximum adverse limit. As an example, a review of sales might suggest a decline as great as 25 per cent or as little as 0 per cent of normal sales in a given recession. This then might be thought of as the range of a normal distribution curve describing probabilities.[1]
3. Using the above ranges, management, with the aid of statisticians, may define the most probable

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[1]See Figure 1, supra, p. 26.

> range of behavior for the key factors and evaluate cash flow behavior based on these factors. The residual cash, if any, after considering outflows is the current debt capacity expressed in terms of annual flow (interest and principal repayment.)

Using the above method, management can produce a debt criterion stated in terms of the number of dollars of debt servicing that are acceptable within management's concept of risk bearing at a given point in time.[1]

Donaldson's method is an approach to what debt the company can bear. It does not solve the problem of what debt amount should be employed to minimize capital cost nor does it indicate whether capital cost varies with debt.

Money and Capital Markets

Prevailing interest rates, stock market performance, and the economic outlook have a profound effect upon investment fund sources. As expanded by Keynes, low interest rates generate greater preference for liquidity, reducing funds available to would-be investors. Conversely, high interest rates increase the willingness of money holders to lend but naturally raise average cost of capital to fund seekers. While the mechanism as described here has been challenged as unrealistic,[2] it serves

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[1] An extension of Donaldson's method, given the optimal debt amount based on other considerations, has been developed by Mao, op. cit., pp. 454-456.

[2] James McN. Stancill, Jr., "The Determination of Corporate Holdings of Cash and Marketable Securities," in Financial Decision Making, ed. by Mock, op. cit., pp. 270-271.

at least as a framework for approach to the interplay of fund availability and cost. High interest rates need not necessarily correspond to low stock market prices but frequently do, as limited investment is a harbinger of reduced earnings.[1] Frequently, given a choice, firms will defer investment during such periods, reducing their capital demand. They may also, drawing upon the interchangeability of funds described earlier, utilize the money market for a period until the capital market becomes less costly.

In any event, interest rates in the capital market do not wholly determine the relative desirability of equity versus debt. As of this writing, fund-seeking firms face a remarkably forbidding combination of circumstances in the capital markets. For the last eighteen to twenty-four months all fund sources have been strained to meet unprecendented demands.[2] Now, with interest rates at record highs for the twentieth century, firms still requiring funds are turning to new equity issues. The turn to equity is not simply because debt charges are high but because institutional sources are almost exhausted, and some firms hope to tap the small investor through equity. The glut of these new issues promises to depress further an already sagging market.[3] The determination of source here is made not just on cost but upon availability.

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[1]Samuelson, op. cit., p. 317.

[2]Corporate Capital Hunt, op. cit., p. 33.

[3]"New Stock Issues," Wall Street Journal, Feb. 6, 1970, p. 1.

While the effects of the money and capital markets are not always clear, they unquestionably impinge upon corporate selection of fund sources. These markets are, furthermore, somewhat responsive to United States Government manipulation. Consequently, fund source selection may be said to be at least indirectly influenced by government policy aside from responses to tax laws and direct action by regulation.[1]

Summary

This chapter examines a variety of possible factors to test their influence upon the selection of capital sources. The objective of the firm is considered first and is accepted out of necessity in order to have a criterion against which to measure the effect of proposed courses of action. Largely upon the predominance of authoritative opinion and the reasoning of Porterfield the maximization of wealth for the common shareholder is accepted as the underlying objective of management in decisions regarding capital fund sources. Conflicts with this basic objective are recognized to exist in management under certain conditions.

The effect of risk is next examined. This factor is found to be the principal reason for differentiation between debt and equity as fund sources. Having previously classified risk into categories designated business and financial, the latter category is discussed as a function of leverage. The ultimate determination of risk to a prospective stockholder is identified as

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[1]Johnson, op. cit., p. 260.

depending upon the broad factors of: (a) the dispersion of the subjective probability distribution assigned to expected dividends, (b) the form of this distribution, and (c) the extent to which random variations in the dividends are correlated with the variations in the returns of other investment opportunities.

The inclination of investors to have an aversion to risk is also investigated. The utility function is used to develop a strong but not conclusive argument for the risk aversion of investors. Additionally, the concept of the certainty equivalent is introduced as a means of establishing an indifference pattern for investors choosing between sure and uncertain income streams.

Following the examination of risk, earnings stability is studied and accepted as a significant determinant of capital fund source selections. The regulated electric utility industry is chosen to exemplify the high debt capacity of a stable-earnings firm. Conversely, the capital structures of firms in seasonal and cyclical industries are reviewed and found to be characterized by low percentages of long-term debt. This finding is considered to substantiate further the acceptance of earnings stability as a capital fund source determinant.

Both regulation and stage in life cycle are surveyed and found to be important, if not predominant, factors affecting the choice of debt or equity sources.

Having presented the risk factor from the standpoint of the investor, risk is next studied in connection with debt capacity. The approach used is that of Donaldson where a rational assessment of financial and business risks are made to permit establishment

by management of realistic debt limits for the firm. While the assessment of all managements is not proven to be rational, it is suggested that some evaluation by management of the firm's ability to sustain debt should enter the capital fund source decision.

The final factor introduced is that of market conditions for money and capital. The varying availability of funds and terms under which they can be obtained are accepted as certain determinants of the funding decision.

CHAPTER IV

ANALYTICAL APPROACHES TO THE EVALUATION OF FUND SOURCE EFFECT UPON CAPITAL COST

The Traditional Approach

The traditional school of capital structure embraces those approaches which admit that, even in the absence of corporate income tax, prudent use of leverage can increase the value of a business.[1] The basic premise of traditional theory, with proper assumptions, will lead to a formulation of optimal financing, i.e., a balanced capital structure where overall cost of capital is minimized. An elementary form of the traditional approach is graphically illustrated by Figure 2. The average cost of capital initially decreases (curve pt) as relatively more debt funds are employed. After a certain point is reached, however, the average cost of capital again rises as stock and bond yields rise substantially because of financial risk. The notations, though not requisite to this example, are introduced here as they will be used again in examination of this concept.

Implicit in this graphic portrayal is the assumption that increases in debt reduce the quality of a stock (after a point)

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[1]Mao, op. cit., p. 416.

and that greater compensation in the form of higher yield is required by investors.

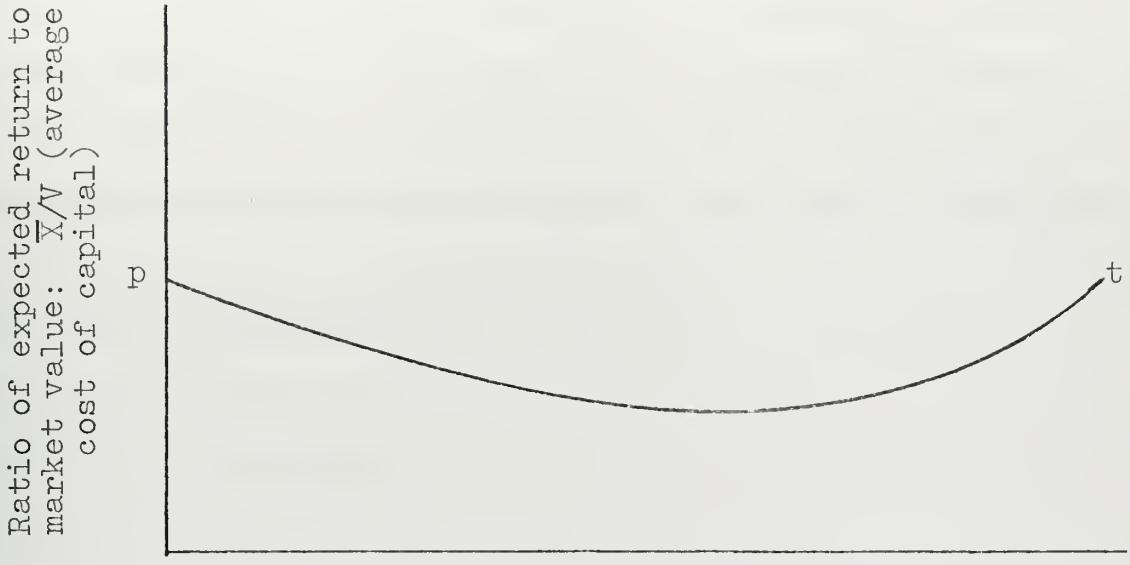

Figure 2. Average cost of capital as a function of debt to market value. Barges, op. cit., p. 11.

$\bar{X}$ = The expected future profits before deduction of interest

S = The market value of common shares of the firm

D = The market value of debts of the firm

V = The total market value of the firm (S + D)

p = The expected rate of return on the common stock of an unlevered company

$\bar{X}/V$ = The average cost of capital to the firm

Writers who accept the principal elements of the traditional concept are too numerous to list.[1] The concept is not uniformly

[1]Representative works include: David Durand, "Costs of Debt and Equity Funds for Business: Trends and Problems of Measurement," Conference on Research in Business Finance (New York: National Bureau of Economic Research, 1952), pp. 215-247; Arthur S. Dewing, Financial Policy of Corporations (New York: The Ronald Press Co., 5th ed., 1953), pp. 437-450.

expressed by its advocates; their varying assumptions would lead to a family of curves similar to pt or even curves of sharply varying rates of change.[1] Infinitely many models could be established, all of which would fit the general statement of traditional views. The treatment of the concept by Eli Schwartz[2] as modified by RM has been found by this writer to be clear and relatively brief.[3] Though most studies in the traditional form have dealt exclusively with long-term debt represented by securities, Schwartz broadened his consideration, as noted earlier. RM, however, do not explicitly do so in this amplification of Schwartz's work presented here.

The treatment is initiated by considering a firm whose amount of required capital is essentially fixed, for instance, a new corporation formed to exploit a particular opportunity requiring investment I_o. The owners must decide the fund sources for their investment, namely, the portion to obtain from equity and the portion to obtain via debt. Their own funds invested will be termed I_E. Debt financing will be represented by I_L and interest by i. Total investment then equals $I_E + I_L$ equals I_o. (One determinant assumed here will be the dollar value of expected dividends relative to stockholders' investment, I_E.) The constant, expected yearly income before interest will be $\overline{X}$ (as in the basic presentation earlier); this value will also equal

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[1]Barges, op. cit., pp. 11-12.

[2]Schwartz, op. cit., pp. 18-39, passim.

[3]Robichek and Myers, op. cit., pp. 29-34.

rI_o where r is the internal rate of return on I_o.[1] With no reinvestment of earnings, i.e., earnings equal dividends, the yearly dividend expected by shareholders is a constant, $\overline{D}$ expressed as:

$$\overline{D} = \overline{X} - iI_L = hI_E$$

Here the term h is used as the expected dividend return per dollar of the shareholders' initially contributed capital. The equation can be expressed explicitly in terms of h in the form:

$$h = \frac{r(I_E + I_L) - iI_L}{I_E}$$

or

$$h = r + (r - i)\frac{I_L}{I_E}$$ [2]

If the spread between r and i is constant, the expression is a linear function of I_L/I_E. Should i rise with increasing debt, h will increase at a decreasing rate. The term h is, in effect, the cost of equity capital. Where no debt is employed, the term I_L/I_E becomes zero and h, the cost of capital, equals r, the internal rate of return on investment.

The treatment above, with capital needs fixed, isolates the effect of the financing decision upon the dividend return.

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[1] Internal rate of return is taken to mean that rate of discount which equates to zero the present value of the entire series of cash flows associated with the investment. It is calculated independently of cost of capital. Mao, op. cit., p. 193.

[2] This form will be useful for contrast with conflicting theory. But note, should an ill-advised management push investment with borrowed funds to the point where interest rate i exceeds internal rate of return r, the value of h declines. This conflicts with reason since equity holders then require less return for greater risk. RM treat this later as do Modigliani and Miller.

In reality this is seldom possible as investment and financing are closely interrelated. There is also the trade off between expected returns and financial risk to be considered. This trade off is ignored in the expressions derived.

To portray the choice between risk and dividend return the idea of the indifference curve will be used. Such curves will define the locus of points representing an investor's trade off positions between h (expected dividend return) and financial risk. The figure below illustrates such curves. Point A

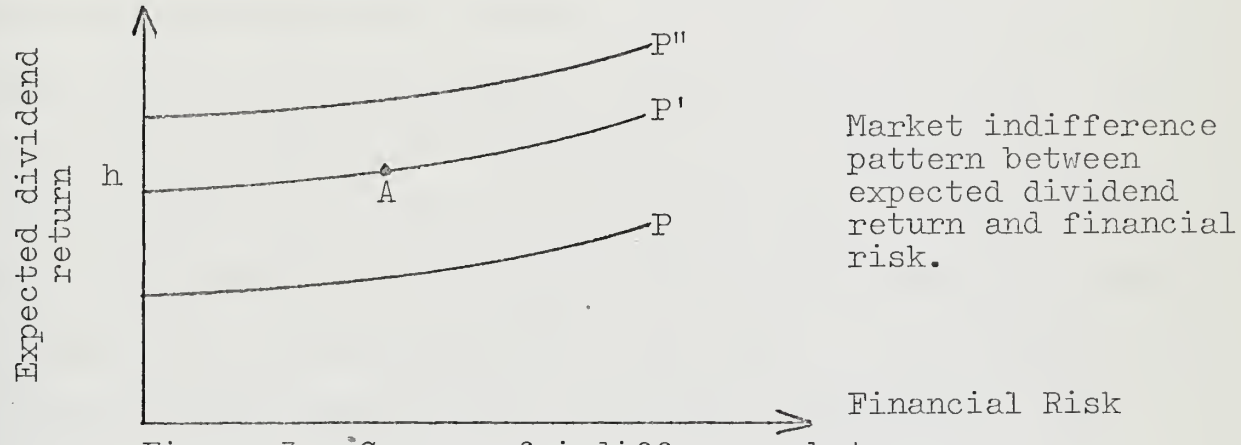

Figure 3. Curves of indifference between dividend return and financial risk. Robichek and Myers, op. cit., p. 28.

represents a hypothetical point for a stockholder. He would move along curve P' with complete indifference, trading off expected return for risk and conversely. He would not willingly move to any curve below P' (say P) but would desire to move up to P" if the opportunity existed. The curves may be considered to define the share price of a stock. Two stocks offering different combinations of risk and expected return might sell at the same price; if so, investors would presumably be indifferent between them.

Changing a firm's financial policies and introducing a new combination of risk and expected returns would leave the stock price unchanged only if the new combination were still to lie on the same indifference curve. "According to this reasoning, the market price of the firm's stock is maximized when investors expect a combination of risk and expected return which is on the highest possible indifference curve."[1]

To determine the exact optimum point for leverage in the capital structure, it is necessary to superimpose upon Figure 3 a curve representing h as a function of financial risk I_L/I_E. The expression for h derived on page 52 enables this to be done. The desired point is then defined by the point of tangency of an investor's indifference curve (representing stock price) to the curve of h as a function of I_L/I_E. The idea is illustrated below where point A is the optimum point. Positions to the right of A are ignored as they would conflict with the assumption of risk aversion.

This approach clearly implies the traditional position, i.e., at lower levels of debt, stockholders would be willing to accept greater risk in return for higher expected dividends made possible by increasing the proportion of debt to equity in the firm's capital structure. At higher levels of debt, the increased expected dividends would not offset the greater risk created by the substitution of debt for equity.

In its original form Schwartz's model was more comprehensive than that portrayed here in that it demonstrated the effect of

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[1]Robichek and Myers, op. cit., p. 32.

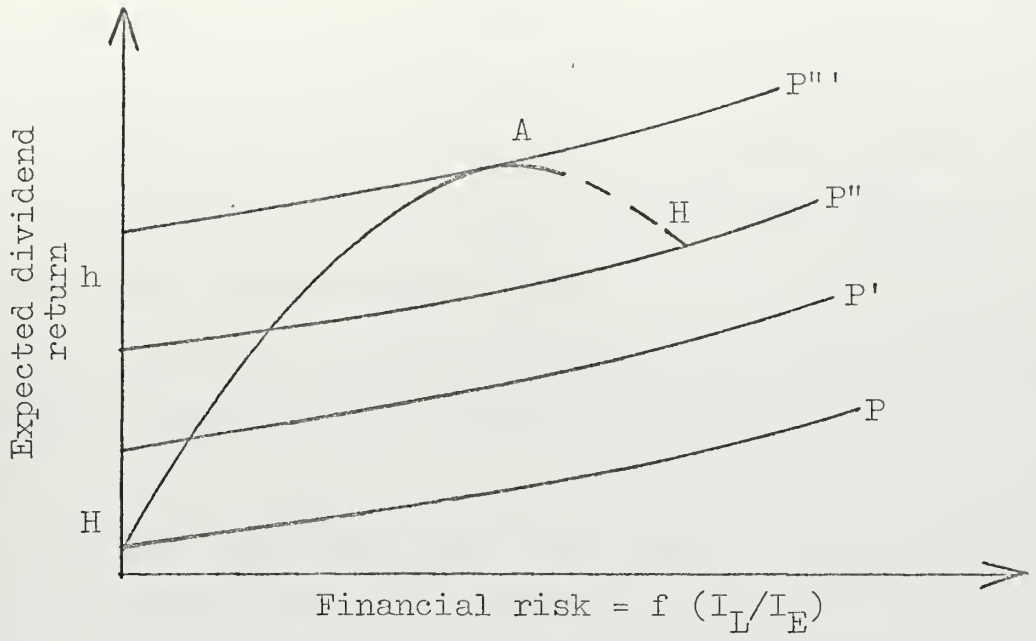

Figure 4. Determination of the optimum debt to equity ratio. Robichek and Myers, op. cit., p. 30.

varying forms of debt (intermediate, short term and trade credit) on the cost of capital. His treatment employed a downward sloping marginal rate of earnings (MRE) concept representing the incremental rate of return obtained by adding additional assets to the firm. Imposed upon the MRE function were schedules of supply for external funds, each schedule relating to a particular amount of ownership (equity) capital. By dividing the total profit (areas under the MRE curve for varying amounts of external capital) by the corresponding equity capital, Schwartz developed a transformation curve of required rate of return to investors versus capital stock in the structure. The X axis, increasing in ownership capital from left to right, describes a decreasing function of financial risk, i.e., as equity increases, leverage decreases.[1] While it seems to this writer that Schwartz's

[1]Schwartz, op. cit., p. 30.

technique would be of questionable practical value due to the difficulty of defining the marginal rate of earnings function, it does not appear much easier to define the RM leverage function. The latter simplification sacrifices the very important concept of fund source interchangeability.

Underlying the approach discussed thus far are a series of assumptions regarding the factors of capital structure. They are:[1]

1. The individual firm faces risk in the form of business risk and financial risk.[2]
2. Business risk is a composite of stability of earnings and the liquidity, safety, and marketability of the assets typically held by the firm.
3. The financial risk of the firm is the risk of its capital structure.
4. Business risk is a parameter imposed by the nature of the industry, though such risk is known to investors and may affect the optimum risk carried by the firm.
5. An optimum capital structure for any widely held company will maximize the long run value per share of the common stock on the market, given any number of shares.

This example of the traditional approach is a static one, that is, there is no provision for change of the capital market

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[1] Ibid., p. 20.

[2] Schwartz used the terms external and internal to describe risk types synonymous with business and financial.

terms or for change in demand of the firm's products. The graphical model by Schwartz did encompass a changing equity base and identified the rate of return to equity required at any given leverage ratio. Presumably this ratio could be varied by reinvestment of earnings, but no equations were developed specifically identifying the reinvestment effect. The equation for h, cost of equity capital, developed by RM assumed away the reinvestment problem and hence, though a useful presentation, is largely unrealistic. A more general statement of equity cost is still needed.

The Modigliani-Miller Position

Most of the questions raised in recent years regarding cost of capital as a function of capital structure were born of the work by Modigliani and Miller (hereinafter called MM) in 1958.[1] In effect, MM held that the real cost of debt, after accounting for the increase in equity cost, is the same as the cost of equity, and that the marginal cost of capital of the firm is equal to the average cost of capital.[2]

As a prelude to their work it is helpful to review their assumptions. They may be summarized this way:[3]

1. Firms can be grouped into homogeneous risk classes. (Subjective probability distributions assigned to the firm's expected values

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[1]Modigliani and Miller, op. cit., pp. 261-297, passim.

[2]Barges, op. cit., p. 5.

[3]Robichek and Myers, op. cit., p. 23.

of yearly income, $\overline{X}$ must be such that all investors value all firms in the class at the same rate of return p).

2. The risk to investors depends not only on the random fluctuations of the expected income in any period, but also on the possibility that the actual value of income may be different from the investors' best estimate.
3. All present and prospective investors have arrived at identical estimates of average expected income $\overline{X}$.
4. Stocks and bonds are assumed to be traded in perfect markets and individuals can borrow substantial amounts at the same rate of interest charged corporations.
5. No taxes are imposed on corporations.

Though not mentioned above, it is important to note that the expected stream denoted by $\overline{X}$ is a stream of profits, not dividends. The profits are before deduction of interest and thus equate to earnings before interest and taxes.[1] It is basic to MM's argument that, "...as long as management is presumed to be acting in the best interest of the stockholders, retained earnings can be regarded as equivalent to a fully subscribed, pre-emptive issue of common stock."[2]

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[1]Modigliani and Miller, op. cit., p. 582.

[2]Ibid., p. 266.

Using the assumptions stated, MM go on to develop a mathematical proof supporting their Proposition I, which is, "The average cost of capital to any firm is completely independent of its capital structure and is equal to the capitalization rate of a pure equity stream of its class."[1] This proposition is expressed mathematically as follows:

$$\frac{\overline{X}_j}{(S_j + D_j)} = \frac{\overline{X}_j}{V_j} = p_k$$

where:

$\overline{X}_j$ = The expected future profits of Company J in class k before deduction of interest

S_j = The market value of its common shares

D_j = The market value of its debts

$V_j = S_j + D_j$ = The total market value of Company J

p_k = The expected rate of return on the common stock of an unlevered company in risk class k or the average cost of capital expressed as $\overline{X}_j/V_j$

MM support their first proposition further by an argument based on arbitrage. They argue negatively that if Proposition I did not hold, investors could exchange stocks and bonds in such a way as to exchange one income stream for another, identical in all respects but selling at a lower price.[2] "The general condition for equilibrium to exist is that no two claims to expected future cash receipts considered to be identical in risk can sell

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[1] Ibid., p. 268.

[2] Ibid.

at prices such that the expected rates of return on the claims differ."[1] RM provide a tabular illustration of the arbitrage principle underlying MM's Proposition 1. Two companies are considered, A and B, the former with all equity financing and valued at $10,000, the latter with $4,000 outstanding debt and valued at $11,000. Each company has the same expected income $\overline{X}$ = $1,000, and is in the same risk class.

TABLE 4

EXAMPLE OF A CONDITION INVITING ARBITRAGE

Variable	Company A	Company B
$\overline{X}$	$ 1,000	$ 1,000
D		4,000
r		0.04
rD		160
iS	1,000	840
i	0.10	0.12
S	10,000	7,000
V	10,000	11,000

Source: Robichek and Myers, op. cit., p. 24.

In the table, i is the stockholders' required rate of return on equity, S. MM's expression $p_k = \frac{\overline{X}}{V}$ is resolved by RM into:

$$p_k = r \frac{D}{V} + i \frac{S}{V}$$

using the relation:

$$\overline{X} = rD + iS \quad [2]$$

The term r is MM's capitalization rate for sure income streams or, simply interest.[3]

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[1] Robichek and Myers, op. cit., p. 25.

[2] Ibid., p. 21.

[3] Modigliani and Miller, op. cit., p. 260.

The values of the two companies are not equal because Company B's stock is overpriced according to Proposition I and the general condition for equilibrium stated on pages 59 and 60.

Now, if a stockholder in B owned 1/100 of the shares of that company, it would pay him to alter his holdings so as to cause a downward pressure on the price of B's stock. The shareholder would sell his shares for $70. He would then borrow $40 so that his personal leverage is the same as that of his old equity in B (Company B's debt/equity ratio D/S was $\frac{4,000}{7,000} = \frac{4}{7}$). With the total of $110, he would buy stock in A, enjoying a net return of $9.40 on his new investment (dividends of $11 minus $1.60 interest charges). This same stockholder earned only $8.40 on his investment in Company B. His risk is identical, according to MM, as they equate personal leverage to corporate leverage.[1]

MM go on to derive from Proposition I a second proposition, shown in Figure 5, concerning the rate of return on common stock on companies whose capital structure includes some debt.

The term i_j is the expected rate of return or yield to equity of a levered company j of risk class k. "The expected yield of a share of stock is equal to the appropriate capitalization rate p_k for a pure equity stream in the class, plus a premium related to financial risk equal to the debt-to-equity ratio times the spread between p_k and r."[2] Again, r represents the capitalization rate for sure income streams and equates to interest.

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[1] Robichek and Myers, op. cit., pp. 24-25.

[2] Ibid., p. 271.

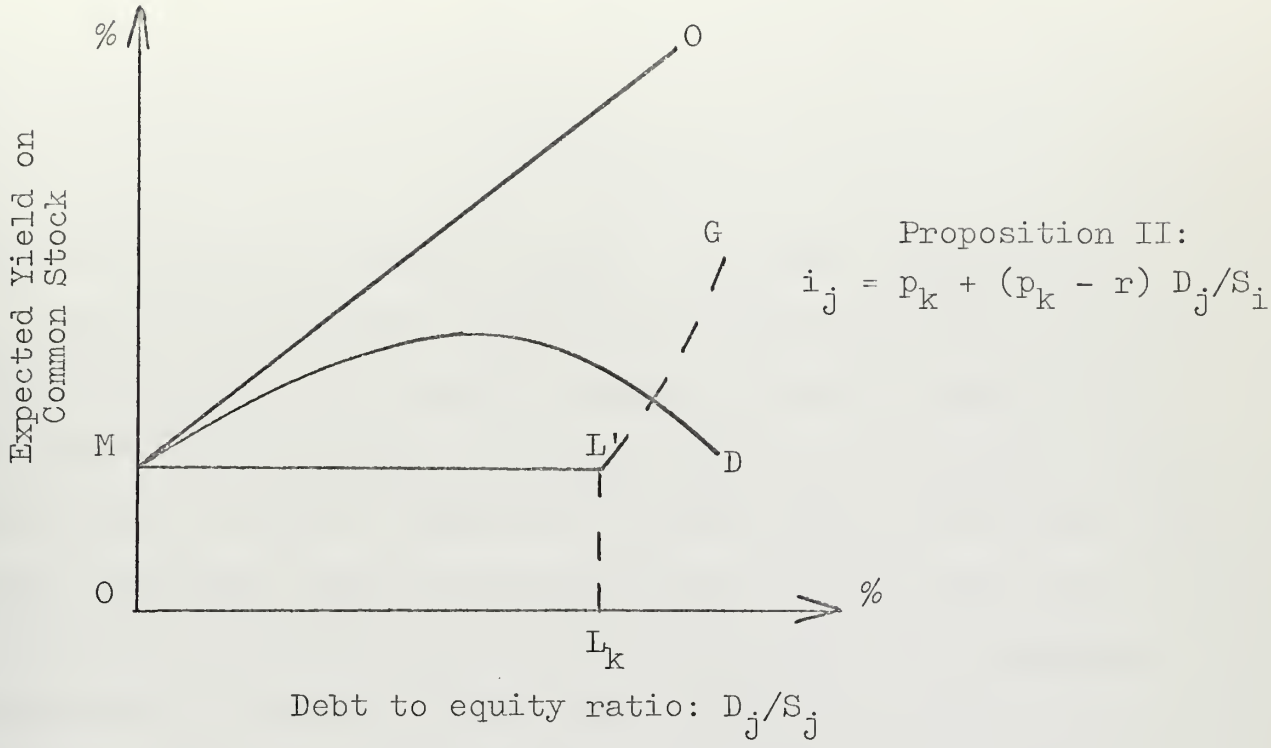

Figure 5. The behavior of expected yield on common as a function of debt to equity ratio. Modigliani and Miller, op. cit., p. 275.

Figure 5, above, provides a visual comparison of MM's Proposition II with traditional concepts. The curve ML'G represents traditional theory where the expected yield is constant along ML' until a certain leverage, L_k, is reached, after which i (and hence p_k) rise rapidly with more debt along L'G. The linear segment MO represents MM's Proposition II wherein r is constant. Recognizing that economic theory and market experience both indicate an interest rate rising with leverage, MM suggest the curve MD as the likely, realistic behavior of i, with leverage. Since i is analogous to the cost of equity capital, Figure 5 may be interpreted as indicating a declining cost of equity capital, after a point, with increasing leverage and interest. This same

relationship is clear from the intermediate equation used in deriving Proposition II, namely,

$$i_j = \frac{\overline{X}_j - rD_j}{S_j}$$

obtained by substituting $\overline{X}_j = p_k(S_j + D_j)$ into Proposition I.[1]

MM contend that the traditional version and that of Durand[2] (not considered in this study) confuses investors' subjective risk preferences and their objective market opportunities. Their Propositions I and II, they say, "...rely merely on the fact that a given commodity cannot consistently sell at more than one price in the market; or more precisely that the price of a commodity representing a 'bundle' of two other commodities cannot be consistently different from the weighted average of the prices of the two components."[3] Their Proposition II defines the cost of equity capital, i. The cost of adding capital, whether equity or debt, will be the marginal cost of capital equal to p_k, the average cost of capital. If this definition were conclusive and generally accepted, there would be no need for further study of the equity cost question. Their Proposition I likewise would eliminate the optimal corporate structure question by proving there is no optimal point.

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[1] Ibid., p. 271.

[2] David Durand, "Costs of Debt and Equity Funds for Business: Trends and Problems of Measurement" in National Bureau of Economic Research, Conference on Research in Business Finance (New York, 1952), pp. 215-247.

[3] Modigliani and Miller, op. cit., p. 279.

Challenges to the MM Propositions

Alexander Barges, in a doctoral thesis, challenged the MM position on both theoretical and empirical grounds.[1] Barges began by asserting that the arbitrage process proposed by MM does depend for its validity on assumptions as to what constitutes adequate compensation to investors for assuming a given degree of risk. The reader will recall the quote of MM given previously claiming the contrary. Barges supports his assertion by stating that the risks of personal leverage through margin and the risks of leverage through the corporation are different. The former, he says, are unlimited while the latter are not. He furthermore contends that a significant body of investors do not buy stocks on margin as a result of aversion to the risk of a sudden margin call.[2]

In extension of his theoretical attack, Barges points out that the equation

$$i = \frac{\overline{X} - rD}{S}$$

(see page 60), used in deriving Proposition II, contains inconsistent variables.[3] The future earnings, $\overline{X}$, are acknowledged as estimated or uncertain. Interest rate, r, however, is taken as certain, apparently equal in value to current rates. Barges proposes an alternate expression,

$$i = \frac{\overline{X} - \overline{I}}{S} = \frac{\overline{X}_c}{S}$$

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[1] Barges, op. cit., pp. 81-82.

[2] Ibid., p. 82.

[3] See supra, p. 60.

where:

$\overline{I}$ = The expected average future interest payments

$\overline{X}_c$ = The expected return to common shareholders

$\overline{I}$ = f (present debt retirement schedules, future management financial policies, future interest rates, etc.)[1]

If one holds that the above equation is superior to that of MM as an expression of i, then Barges feels that one of the following conclusions must be reached:

(1) Proposition I does not imply Proposition II; or,

(2) The definition of average cost of capital in the equation $\frac{\overline{X}_j}{V_j} = p_k$ is incorrect; or,

(3) The constant, p_k, is incorrect; or

(4) A combination of (1), (2), or (3) above

The remainder of Barges's theoretical arguments are based on probability analyses and will not be discussed. His challenge to MM's empirical work lies largely in discovering the use of the random variable V in the denominator of both the dependent and the independent variables. This would, under frequently encountered conditions, result in tests which biased the results in favor of MM's propositions.[2] To avoid the same bias, Barges used book values rather than market values for the X variables in his own empirical work (debt/total equity and senior securities/common equity).[3] It is important to note, however, that Barges's

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[1] Barges, op. cit., p. 89.

[2] Ibid., p. 101.

[3] Ibid., pp. 34-35.

empirical work did not conclusively discredit MM's findings.[1]

RM have reviewed the work of several authorities who take issue with MM's first study. Among the works reviewed by them are those of Boness[2] and Solomon.[3] RM cite general disagreements on the MM assumptions as follows:[4]

(a) Market imperfections may prevent full operation of the arbitrage process.

(b) Increasing leverage may force the firm to pass up profitable investments which an otherwise identical but unlevered firm would take. (This statement relates to the earlier discussion of debt capacity in this study).

(c) Investors may disagree on the risk class of firms.

(d) Investors may, in fact, not be indifferent between dividends and increased present value of future dividends.[5]

RM go on to take exception with Proposition II where the cost of equity declines with increasing leverage under the condition of interest rate rising with leverage.[6] By differentiating interest cost (r times debt) with respect to debt, RM develop the

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[1]Mao, op. cit., p. 448.

[2]A.J. Boness, "A Pedagogic Note on the Cost of Capital," Journal of Finance, XIX (March, 1964), 99-106, passim.

[3]Ezra Solomon, "Leverage and the Cost of Capital," Journal of Finance, XVIII (May, 1963), 273-279, passim.

[4]Robichek and Myers, op. cit., pp. 40-41.

[5]Ibid., p. 55.

[6]See supra, pp. 56-57.

equation,

$$m = \text{marginal rate of interest} = r + L \frac{dr}{dD}$$

They then rewrite MM's Proposition I as:

$$p_k = r \frac{D}{V} + i \frac{S}{V}$$

change it to

$$p_k V = rD + iS$$

and set its derivative equal to zero to determine the point beyond which i (cost of equity) declines, V and p_k being constant.[1] RM find that for i to decline as debt is substituted for equity, m (the marginal interest rate) must be greater than i (the cost of equity or expected return to equity).[2]

Using the developed relationship of marginal interest rate and return to equity, RM conclude that m cannot exceed i. If it were so, they argue, debt holders would demand a greater return on the incremental debt than would equity holders demand on their less certain investment. This paradox was unsatisfactorily explained by MM in the opinion of this writer. Lintner faults MM on the same point, concluding that Proposition I is incorrect since, claims Lintner, the expected earnings stream is not independent of leverage.[3] Proposition II is derived directly from I and if it is incorrect, II must necessarily be incorrect. RM do not develop a model or solution procedure to supplant MM's. Instead they develop what they term a normative framework, tying

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[1] Robichek and Myers, op. cit., p. 48.

[2] Ibid., p. 35.

[3] John Lintner, "Dividends, Earnings, Leverage, Stock Prices and the Supply of Capital to Corporations," The Review of Economics and Statistics, XLIV (August, 1962), 269.

together what is known of the major variables into an approach to decision making for maximizing the value of equity shares.[1]

John Lintner totally rejects the propositions of MM. He first disproves, to his satisfaction, the interchangeability of dividends and earnings, establishing the former as the determinant of stock prices. He says, "The 'dividend theory' that prices are equal to the present values of the cash flow to the investor remains valid even under fully generalized conditions and should be the basis for further theoretical work."[2] He goes on to conclude that, except under fully idealized conditions of certainty, the earnings yield is a continuously rising, nonlinear function of corporate leverages at least beyond some initial point.[3] If Lintner's statements were accepted, we would be left with one variant of the traditional concept.

In support of Lintner's stand on dividends, though not in direct contravention of MM's theory, Dirhan Bodenhorn has provided a rationale for rejecting the discounted earnings stream as the determinant of stock price. Bodenhorn considers a firm with a net income of $100 in the first year, retaining $50 and paying $50, and thereby enjoying an income of $105 in future years. He maintains that the correct present value to the shareholder is the $50 of the first year (not the $100) plus the discounted stream of $105 per year for future years.[4] While his argument is

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[1]Robichek and Myers, op. cit., p. 94.

[2]Lintner, op. cit., p. 268.

[3]Ibid., p. 269.

[4]Bodenhorn, op. cit., p. 489.

is persuasive, experience contradicts the dividends approach since observable stocks, paying no dividends, sell at positive prices.[1] For this reason alone, Lintner's solutions do not seem final or all inclusive.

At this point it seems appropriate to return to the possibility suggested in the introduction that one concise theory may not suffice to embrace all corporate situations. At least one authority has noted this circumstance. Professor Van Arsdell states:

> At best, however, a classification of the approaches to cost-of-capital analysis must be qualified by admission of over-simplification. Economic theorists are in substantial disagreement as to the optimal decisions for capital administration even under assumed conditions of certainty... Moreover, opinions of economists differ as to the composition of the capital or investment base, of the earnings stream and of the discount rate.[2]

Van Arsdell goes on to identify four types of income streams that have received attention in literature dealing with the cost of capital. These are: net cash flow, net income or net earnings on common, net income plus bond interest (net operating income), and cash dividends. He concludes that the analyst must determine which analytical approach best fits the firm under consideration.[3]

The net operating income approach was considered by MM as may be confirmed by re-examining their definition of $\overline{X}$ on page 59 of this study. This approach is characterized by the derivation of an overall rate for cost of capital without first solving for

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[1] Robichek and Myers, op. cit., p. 61.

[2] Cohen and Robbins, op. cit., p. 742.

[3] Ibid., pp. 742-743.

the cost of debt capital and the cost of equity capital separately.[1] For instance, MM first determine p_k from $\overline{X}/V$. The separate value i, for equity cost, is derived from the overall expression. The cost of debt is taken by MM as the effective interest rate, as noted earlier.

Cost of Capital

The concept of an optimal capital structure is only significant as a means of minimizing to the firm its cost of capital, disregarding for the moment the significant nonquantitative aspects covered in Chapter III. There is little argument that the cost of capital to a firm at a given point in time is the weighted average of the cost of equity and the cost of debt.[2] Ignoring the many qualifying statements introduced already in this chapter, such an average could conceivably be determined by using $E_a = \frac{\text{Expected Earnings}}{\text{Market Price}}$ = Cost of Equity and current interest rate demanded by creditors = cost of debt. Then (ACC) Average Cost of Capital = $\frac{\%\ \text{Equity}}{\text{Mkt. Value}} \left(\frac{E_a}{P}\right) + \frac{\%\ \text{Debt}}{P}$ (i). Thus expressed, the ACC is completely general depending upon how E_a and i are determined. To satisfy the Bodenhorn school, E_a can be assumed for illustration here to be all paid out in dividends (expected). Having computed the ACC at a point in time, and being faced with a need for funds, the question arises of which fund source to employ to cause the least incremental increase in ACC. This incremental increase (or decrease) in capital cost is the marginal cost of additional

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[1] Ibid., p. 744.

[2] Lindsay and Sametz, op. cit., p. 321.

capital (MCC). It is the cost we seek to minimize by proper fund source selection.[1] After all, the question of this study does not contemplate dissolution of the firm, hence the existing capital structure is taken as given, subject to intelligent retirement of debt or refunding. If MM were to be followed, the ACC would equal the MCC, being unaltered by choice of debt or equity sources.

Since the question here is not one of hurdle rate for investment, but rather, one of investment source, cost of capital formulas based upon static conditions do not suffice to predict the MCC unless the simplifying assumptions required to justify the formulas are realistic. If such were the case, formulas provided by many writers, such as Mao, could be used for determining the existing cost of equity and debt separately.[2] But the new ACC after additional financing cannot be determined unless the effect of the financing decision on the firm is known. Except then, when it is assumed that debt and equity capital costs are in no way interdependent, cost formulas incorporating neither considerations of leverage nor other risk factors are alone of no real value in the approach to capital structure. There has been discovered by this writer no authority who maintains a theory of complete independence between debt and equity funding costs except where the amounts are insignificant and/or the time periods short. Accordingly the question of separate debt and equity costs will not be pursued further.

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[1] Ibid., p. 340.

[2] Mao, op. cit., pp. 377-378 and 385-405.

Methods of Valuation

The preceding discussion strongly suggests that questions of capital costs are inextricably bound up with concepts of stock valuation. In fact, it is widely accepted that a corporation's cost of capital cannot be determined until an analysis is made of how the market values the firm's common stock.[1] Since the accepted objective has been established as maximizing owners' wealth, the optimal financing solution will be attacked from the aspect of share valuation. Possible methods to be examined here will build upon and add to the income streams identified in the preceding section.

Mao considers four alternative valuation theories, reducing them all to equivalent statements.[2] He begins with a method which exactly fits none of the four income streams already mentioned. The method is termed by him The Investment Opportunities Approach inasmuch as it equates the value of a company's shares to the present value of existing assets plus the present value of future investment opportunities.[3] The terms used in this formulation are:

E'_t = Constant annual earnings from existing assets assumed to be received @ end of year t

b = The fraction of each year's earnings reinvested

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[1]Eugene M. Lerner and Willard T. Carleton, "The Integration of Capital Budgeting and Stock Valuation," in Foundations for Financial Management, ed. James Van Horne (Homewood, Ill.: Irwin, 1966).

[2]Mao, op. cit., p. 477.

[3]Ibid., pp. 471-473.

at rate of return r per annum.

k = Rate of return required by investors, or alternatively the cost of equity capital to the firm (the costs of issuing new securities are assumed to be zero). The term k is identical in meaning to the term i used by MM.

The mathematical expression becomes:

$$V_1 = \frac{E_1'}{k} + \sum_{t=1}^{\infty} \left[\frac{bE_1' (1 + br)^{t-1}}{(1 + k)^t} \right] \left(\frac{r - k}{k} \right)$$

Reinvestment in the year t (t = 1, 2...) is expressed by the numerator of the first term and is

$$bE_1' (1 + br)^{t-1}$$

This model of valuation is compared by Mao with one developed by MM and found to be at least implied by their model published in an article "Dividend Policy, Growth and the Valuation of Shares," Journal of Business, XXXIV (October, 1961), pp. 411-433.

Using the net earnings income stream, Mao develops a second model called The Stream of Earnings Approach expressed as:

$$V_1 = \sum_{t=1}^{\infty} \frac{E_t' - I_t'}{(1 + k)^t}$$

The term I_t' is nothing more than the expression for reinvestment in the year t, already given above as:

$$bE_1' (1 + br)^{t-1}$$

The rationale for the model is that if a firm must undertake additional investments to produce the projected earnings, the cost

of these investments must be deducted from the current earnings in the years when the investments are made.[1]

A third model, The Stream of Dividends Approach, introduces the new term $D'_{t,1}$.[2] It represents the total amount of cash dividends paid in year t on shares of record at the beginning of year 1. With expectation of future cash dividends of $D'_{1,1}$ $D'_{2,1}\cdots$ The current market value, V, of these shares is then:

$$V_1 = \sum_{t=1}^{\infty} \frac{D'_{t,1}}{(1+k)^t}$$

A simplifying assumption introduced into the model is that there is no outside financing, hence, cash dividends D'_t equals the excess of earnings over investments,

$$E_t' - I_t'$$

The equation is immediately seen to be equivalent to that of the earnings approach.

The fourth model, again using one of the classic income streams listed on page 69 is The Discounted-Cash-Flow Approach. With the assumptions made for all the models, this one is found equivalent to the others.[3]

Reviewing the four approaches is valuable, if at all, because, it can be seen therefrom that with proper assumptions they are all equivalent. They all rest upon the functional relationships of: forecast probability, the rate of return

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[1] Ibid., p. 474.

[2] Ibid.

[3] Ibid., p. 475.

required by the investors, and the value of the company's shares.[1] With the cost of issuing new securities assumed to be zero, as was the case, the rate of return required by investors was equal to the cost of equity capital to the firm. The four formulas all give the same value if k is constant, a condition agreed upon by most writers so long as conditions of certainty, rationality, and perfect capital markets prevail. The disagreement, as over MM's hypothesis, is whether cost of capital, k, is constant when the three conditions do not hold.

In support of the theory that k is determined by dividend policy, Myron Gordon has presented some of the best known work.[2] The spectrum of contemporary controversy is reasonably well defined by MM at the extreme, considering the earnings stream as all important; Gordon in the middle, leaning toward the dividend hypothesis but flexible; and Durand, the extreme supporter of the dividend hypothesis.[3] With the degree of controversy existing over method, it is still seemingly reasonable to apply dividend valuation methods to many firms whose current and probable future policies include stable payouts.[4] This being the case, the model of Bierman and Smidt, adapted from Gordon's work, may be a reasonable approximation for valuation of certain firms, where debt is not employed. Cost of equity might then be likewise determined. The approach, however, would not aid in determining

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[1] Ibid., pp. 476-477.

[2] Ibid., p. 480.

[3] Ibid., p. 493.

[4] Gordon, op. cit., pp. 46-47.

the relative benefits to the owners that might be enjoyed through debt leverage.

Interestingly, though, this formula does suggest the introduction of risk and uncertainty. The expression for value used is:[1]

$$P_o = \frac{D_o}{k - g}$$

where:

k = Cost of common stock

P_o = Current market price per share

D_o = Current dividend rate

g = Expected annual percentage rate of increase in future dividends, expressed as a decimal fraction.

Since all unknown factors are summarized in the term g, it would presumably be possible to reconcile this simple model with almost any other, MM's included, by appropriate assumptions as to how leverage and retained earnings affect the investor's determination of g.

Dividend Policy Effect on Valuation

In the preceding presentation of valuation formulas, the Investment-Opportunities Approach took into consideration reinvestment of earnings. A somewhat more exhaustive treatment of the reinvestment effect upon valuation is given by RM, based upon work by Gordon.[2] Preliminary to a study of formulas, the

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[1] Bierman and Smidt, op. cit., pp. 146-150.

[2] Robichek and Myers, op. cit., pp. 60-62.

general considerations in dividend policy are:[1]

1. Dividends are foregone to increase the present value of future dividends, but the time pattern is shifted thereby. Since near future dividends are less risky than those expected farther in the future, the distant dividends may be more heavily discounted by investors.
2. With imperfect markets as in reality, stockholders cannot always reinvest dividends at the rate of return on equity due both to brokers' fees and individual tax.
3. Differential tax rates between capital gains and straight income may affect investors' preference.
4. The raising or lowering of dividends may affect stockholders' opinion of how management views future prospects. It is presumed by RM that investors favor retention when they preceive that the investment opportunities are sufficiently profitable.
5. It is likely that not all investors agree upon the risk class and prospects of the company. (This was the first assumption underlying MM's argument.)

With these considerations in mind, a representative firm is assumed to finance its investment solely from retained earnings so:[2]

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[1] Ibid., p. 54-55.

[2] Ibid., p. 59.

$$D_t = (1 - b)\, X_t$$

where:

D_t = The dividend paid to shares in existence at time zero

b = The proportion of earnings retained (constant)

X_t = The actual income total in any future period t

and:

$$X_{t+1} = X_t + rbX_t = X_t\,(1 + rb)$$

where:

r = The return to new investment (constant)

then:

$$X_t = X_o\,(1 + rb)^t = X_o e^{rbt}$$

The value of the firm in year zero, V_o, can then be written as the present value of all future dividends, discounted at a constant rate k (required rate of return on equity) or:

$$V_o = \int_o^\infty D_t e^{-kt} dt$$

since:

$$D_t = (1 - b)\, X_o e^{rbt}$$

substituting the expression for X_t into that for D_t

then:

$$V_o = \int_o^\infty (1 - b)\, X_o e^{rbt} e^{-kt} dt$$

If k is greater than rb (required rate of return to equity greater than the growth rate), integration will yield:

$$V_o = \frac{(1 - b)\, X_o}{k - rb}$$

If V_o is known, k can be determined as:

$$k = \frac{(1 - b)\, X_o}{V_o} + br = d + br$$

where:

d = The current dividend yield

While the foregoing model is impressive for its simplicity and ability to provide k by employing current, rather than expected values of r, b and X_t, it has a strong weakness. Still the development of the expression is a helpful insight to the factors of dividend policy. If differentiated with respect to b, the resulting expression

$$\frac{dV_o}{db} = \frac{X_o}{k - rb} \quad (r - k)$$

reveals that where r is less than k, all earnings should be paid out. Conversely, where r exceeds k, the firm can expand infinitely at only the cost k for new stock. Its weakness is that r, the rate of return to investment, is not likely to remain constant with infinite investment. To be realistic, the functional rate of change of r with increasing investment need be known.[1]

The Effect of Corporate Income Tax

Most writers on the subject of capital structure theories eventually include consideration of tax. This factor has already been introduced in Chapter II as a determinant of capital structure. Gordon, Solomon, Lintner, and Mao, to name a few, all cover this analysis. Because RM's treatment is simple, yet adequate, it will be used for illustration.[2] The following terms apply:

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[1] Ibid., p. 62.

[2] Ibid., pp. 38-40.

$\overline{X}$ = Expected yearly income before tax and interest

$\overline{X}_T$ = The firm's expected yearly income after taxes but including interest payments

T = Tax rate

L = Market value of debt

p_o = The rate at which investors value the after-tax earnings $(1 - T)\ \overline{X}$ of an unlevered firm

i = Interest rate

i_t = The rate at which investors capitalize the sum TiL

For an unlevered firm,

$$\overline{X}_T = (1 - T)\ \overline{X}$$

For firms in general,

$$\overline{X}_T = (1 - T)\ (\overline{X} - iL) + iL$$

or

$$\overline{X}_T = (1 - T)\ \overline{X} + TiL$$

The iL factor arises because interest is deductible from earnings as an expense, thus that portion is not taxed. The term TiL may then be thought of as a rebate, in the form of lower effective interest costs to stockholders of levered firms. The after-tax value of the unlevered firm will be:

$$V_T = \frac{(1 - T)\ \overline{X}}{p_o}$$

For the levered firm the after-tax value will be:

$$V_T = \frac{(1 - T)\ \overline{X}}{p_o} + \frac{TiL}{i_t}$$

RM reason that fluctuations in TiL will be subject to the same

risk, if any, of the interest payments and i, therefore, should normally equate to i_T. The value of the levered firm after tax then becomes:

$$\overline{V}_T = \frac{(1 - T)\,\overline{X}}{p_o} + TL$$

The implication is that the after-tax cost of capital $p_t = \overline{X}_t/V_t$ declines with leverage. Furthermore, since debt increases the after-tax value of the firm, its use would always seem preferable to equity. Carried to the limit, this preference would cause firms to approach an all-debt capital structure. The fact that all firms do not even use debt leads one to consider the MM proposition suspect. The reasons why firms may not do so were discussed in Chapters II and III. With the existence of corporate tax and the apparent soundness of the previous analysis by RM, it seems practical to undertake fund source selection as though an optimal capital structure were assumed to exist.

Approaches to Capital Structure Under Conditions Approximating Reality

It will be recalled that all the models and approaches discussed thus far have been constrained by assumptions effectively limiting their use. This study will follow the method of RM in relaxing the limiting assumptions in an effort to gain a general approach to the optimal finance question. Such an attempt naturally implies that the MM propositions are rejected here, as indeed they are, principally on the basis of the existence of tax.

RM suggest as a starting point the following valuation model:[1]

$$P_o = \sum_{t=1}^{\infty} \frac{D_t^*}{\prod_{\gamma=1}^{t} (1 + \bar{i}_\gamma)} = \sum_{t=1}^{\infty} \frac{a_t \bar{D}_t}{\prod_{\gamma=1}^{\infty} (1 + \bar{i}_\gamma)}$$

It is in the general form of the stream of dividends model of Mao on page 74. The terms are defined as follows:

P_o = Market price of a common share

$\bar{D}_t$ = Expected dividend per share in year t

$\bar{i}_\gamma$ = Discount rate expected to prevail during period γ; equates to the essentially riskless rate of interest expected to prevail, for instance, government bonds

$\prod_{\gamma=1}^{t} (1 + \bar{i}_\gamma)$ = Denotes the product $(1 + \bar{i}_1)(1 + \bar{i}_2)(1 + \bar{i}_t)$ Normal discount $(1 + i)^t$ is not used because the rate i_γ is not constant.

$\underline{a}_t$ = A factor such the risk averting investor is indifferent between $\bar{D}_t$ and a dividend $D_t^* = \underline{a}_t \bar{D}_t$ which is certain to be paid. $0 \leq \underline{a}_t \leq 1$ This factor is termed a certainty equivalent and was discussed in Chapter III.

The equation involves certain conclusions. It conforms to the discounted present value method. It considers expected dividends as the appropriate basis for establishing stock value. It embodies the certainty equivalent approach to uncertainty, and it applies only to an <u>individual</u> shareholder's expectations and attitudes toward risk. At this point the equation involves no conclusions

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[1] Though RM defines $\underline{a}_t$ as above, it seems more logical to define it as $0 < \underline{a}_t \leq 1$ as it is impossible to conceive of a risk averting investor being satisfied with a dividend of 0 times $\bar{D}_t$.

regarding the relation between financial leverage and value.[1] In order to generalize the equation further, RM introduce the time preference factor, γ, representing the degree to which the firm's dividend policy is optimal <u>to the investor</u>. If, for instance, the policy was 80 per cent pay out when the investor purchased the stock, its dividend policy may have been optimal to investor X and $\gamma_t = 1$. Future plans to invest through retained earnings may promise to decrease pay out to 60 per cent, a policy not optimal to Mr. X even if share value increases somewhat or later dividends increase. The term γ_t then is reduced in value. The equation becomes:

$$P_o = \sum_{t=1}^{\infty} \frac{\gamma_t a_t \bar{D}_t}{\prod_{\gamma=1} (1 + \bar{i})^t}$$

By redefining $\bar{D}_t$ to be the expected dividend if investors' current expectations of future inflation turn out to be exactly correct, the factor of inflation is considered. RM provide some theoretical methods for incorporating inflation effect but they will not be presented here.[2]

Having developed the above valuation expression, RM propose a practical application for financing decisions. By means of testing a range of financing strategies in a simulation-heuristic procedure, RM seek to discover the one strategy maximizing the value of stock through maximization of the expected return to common shares. The leverage problem is then handled external to

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[1] Robichek and Myers, <u>op. cit.</u>, p. 95.

[2] <u>Ibid.</u>, p. 106.

the valuation formula above by means of its effect upon $\overline{D}_t$. Their procedure is staged, and for the long-term financing decision proceeds as follows:[1]

Stage I

1. Select a time period and planning horizon.
2. Specify certain preliminary financing alternatives, such as a tentative dividend policy.
3. Project the cash flows under the assumption that the investment decisions are given.
4. As with Donaldson's approach to debt capacity, relationships between inventories and fixed assets must be estimated, as must other similar relationships affecting cash.

The outputs of this stage are the preliminary forecasts of financial needs over time.

Stage II

It is at this point that the heuristic approach is introduced through identification of alternative strategies available to the firm. The strategies must specify:

1. The type of financing instrument to use, debt, common stock, other
2. Timing of issues
3. Maturity of issues other than common
4. Expected interest rates

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[1] Ibid., p. 137.

5. Possible revisions in dividend policy

The output of this stage should provide all the information consistent with cost of acquiring it, which will assist in the final selection of strategy. For instance, RM estimate a market price for common in ten years for each of the several strategies under review. This estimate is derived from multiplying projected earnings by the price earnings ratio assumed. Though they acknowledge the naivete of this procedure, no specific remedy is suggested other than "great care."[1]

Stage III

Through use of the equation introduced on page 82, the decision maker in this stage attempts to evaluate the differential effect of the alternative strategies upon the value of the common share. As a practical simplification, the equation is modified to the form:[2]

$$P_o = \sum_{t=1}^{10} \frac{a_t \bar{D}_t}{(1+\bar{i})^t} + \frac{a_v \bar{P}_{10}}{(1+\bar{i})^{10}}$$

The number 10 is the arbitrarily chosen time horizon of ten years. The selection of a time horizon makes necessary the forecast of market value at the end of that time horizon, hence the second term. The factor γ_t is dropped, though, as mentioned earlier, RM suggest means of incorporating this factor. The denominator (in both terms) is now the compound factor of constant discount rate $\bar{i}$. Again, RM point out that the more complex $I^{t}_{\tau} = (1 + \bar{i}_{\tau})$

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[1] Ibid., p. 147.

[2] In this form, the valuation conforms to the third concept suggested by Gordon, supra, p. 9.

can be used if any basis exists for varying the discount rate with time.[1] Values of $\underline{a}_t$ must be estimated (as must the current certainty equivalent factor). RM suggest two out of infinitely many ways this might be done. Having determined $\underline{a}$ by comparison between appropriate corporate securities and payments from government securities, $\underline{a}_t$ might be estimated to decline either linearly or exponentially as:

$$\underline{a}_t = 1 - at$$

or

$$\underline{a}_t = e^{-bt^2}$$

The value for a_v was defined as $\underline{a}_{15}$, implying that the certainty equivalent factor for the forecasted end-of-horizon market value is relatively less than the factor for the forecasted dividend in that year.

Using the methods described above, P_o may be determined for each strategy in each of the years out to the time horizon and for values of $\underline{a}$ varying in accordance with any function. The highest values for P_o then indicate the desired strategy. Note, however, that the solution in this case is not uniquely optimal. Instead, the values of P_o simply indicate the impact of changes in the certainty equivalent factor upon common share value for each strategy. It is conceivable that different certainty equivalent factors should be applied to the various strategies.

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[1] Robichek and Myers, op. cit., p. 149.

[2] RM do not identify the source of the variable, b. In their example it is given values from .01 to .10 in .01 increments. It is not equal to reinvestment rate, a definition assigned b earlier in their book.

Accordingly, the system for evaluating a could be modified, with resulting relative changes in P_o.

The method described is simply one example of a simulation-heuristic technique. For all its complexity and variety of assumptions, the method is systematic. RM argue that with current computer ability and existing simulation techniques for developing the basic information input, the heuristic approach based on that information offers a rational approximation to the optimal solution for fund sources. The approach of Donaldson to evaluation of cash flows described in Chapter III exemplifies one method of generating the Stage II information. RM state that their personal experience with the Monte-Carlo method offers a totally different avenue to the optimal solution, but with greater programming complexity.[1]

A second general, or all-inclusive model for share valuation, and hence capital cost, has been developed by Reisman, Weston, and Buffa.[2] Their method involves a system of thirteen equations whose simultaneous solution determines the optimum mix of internal equity, outside equity, and debt.

Because of its general nature, the system can accommodate any of the specific assumptions or constraints presented by other writers as uncovered by this study. Because of the factors considered therein the originators refer to their system as the

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[1] Robichek and Myers, op. cit., p. 153.

[2] Arnold Reisman, Fred J. Weston, and Elwood S. Buffa, Toward a Theory of Optimum Financing Mix (Los Angeles, Calif.: Western Management Science Institute, UCLA, 1964), pp. 1-5.

PRADIENTX model.[1] The letters of the acronym represent:

P - Price of a share of equity

R - Revenue

A - Assets

D - Dividend rate

I - Interest rate on debt

E - Rate at which expenses are generated (excluding D, I, and T)

N - Number of shares

T - Tax rate

X - Earnings/share

Uncertainty is not incorporated into the basic model but could be employed without difficulty.[2] The uncertainty equivalent factor as used by RM or Lutz and Lutz would be one method of allowing for this. The complexity of the system precludes its comparison with that of RM. It seems, however, that with consistent input, the results would be compatible. This presumption is based on the apparently conventional forms of the equations. Reisman, Weston, and Buffa do not contribute to the conceptual understanding of the optimal financing problem, but they do add an approach to its approximate solution.

Summary

The traditional approach to capital structure postulates the existence of an optimum or balanced capital structure

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[1] Ibid., p. 5.

[2] Ibid., p. 14.

where the overall cost of capital to the firm is minimized. Using basically traditional concepts from Schwartz and RM, a method of determining the optimum mix of debt and equity is developed by means of indifference patterns and a relationship expressing expected dividend return as a function of financial risk, I_L/I_E.

The MM propositions are contrary to the traditional concept. They hold that the real cost of debt, after accounting for the attendant increase in equity cost, is the same as the cost of equity, and that the marginal cost of capital to a firm is equal to its average cost of capital. By means of an arbitrage technique, MM demonstrate that no two claims to expected future cash receipts, with identical risks, can sell at prices which cause the expected rates of return on the two claims to differ. MM assume that no tax exists.

Barges's challenge to the MM propositions was discussed from both the theoretical and empirical aspects. Though suggesting a rejection of them, Barges does not conclusively disprove the MM propositions. The analysis of RM was then reviewed beginning with emphasis upon the disagreement concerning underlying assumptions. RM demonstrate that the MD curve of Figure 5, in order to exist as shown, requires that the marginal rate of interest must be greater than the yield to equity. This unlikely condition places Proposition II in question.

As a concluding element on the discussion of MM's work, their assumed income stream was compared with other income streams common in finance literature.

The cost of capital was discussed briefly. It was determined that, for purposes of this paper, the significant aspect of capital cost is the marginal change in cost occasioned by the financing decision. Due to the interdependence of debt and equity costs revealed by previously mentioned material, averaging the separate costs determined by formulas for debt or equity is not the most useful technique for solving the capital source selection problem.

The selection of capital sources was then approached from the standpoint of the decision's effect upon common share value. Several models proposed by Mao were evaluated. They all were found to depend upon the functional relationship of: forecast probability, the rate of return required by the investors, and the value of the company's shares. Furthermore, they were all discovered to produce identical values where k (cost of equity capital) is constant.

Dividend policy and its effect upon k were analyzed briefly but sufficiently to conclude that there is little agreement within finance literature on this relationship. The effect of dividend policy upon valuation of common shares was then studied using a hypothetical firm assumed to finance its investment solely from retained earnings. This model, based upon Gordon, was found to be useful but weak in that it assumed a constant internal rate of return, r. A situation where r remains constant with increasing investment is considered unlikely.

A basic assumption of MM is the absence of tax. Using the method of RM it was shown that the value of a levered firm is

greater by a factor TiL/i_t than an equivalent unlevered firm, both in a tax environment. Based on this demonstration, the MM propositions are rejected here and some form of the traditional concept concluded to prevail.

Having found all of the models and approaches investigated to be constrained by apparently unrealistic assumptions, an alternative technique from RM was analyzed and found to be useful. The method involves the use of a relationship where the market price of a common share, P_o, is expressed in terms of: expected dividends per share, discount rate expected (interest rate on riskless securities), and a certainty equivalent. The effect of financial risk arising from leverage is accounted for by appropriate application of probabilities to the projections for expected cash flows. Dividend policy is similarly accommodated by adjusted cash flow projections. The repetitive solution for valuation, using different financing strategies and their attendant cash flows leads to the optimum strategy. The solution, while not uniquely optimal, can conceivably approach the optimal through use of computerized methods to simulate enough strategies and test for the sensitivity of variables.

A final consideration was given to a method by Reisman, Weston, and Buffa which utilizes a system of simultaneous equations. This method, like others discussed earlier, could be employed along with the simulation techniques offered by RM.

CHAPTER V

CONCLUSIONS

It was the primary goal of this study to identify those factors which should be considered in determining the capital source for investment. As a preliminary step, the alternative sources were studied in Chapter II to determine their inherent nature and their limitations. Chapter III then reviewed the arguments of financial theorists and practitioners regarding the factors suggested. In Chapter IV, the quantifiable aspects were analyzed in a mathematical manner to determine their roles and significance. The following factors are concluded to be significant to the selection of fund sources:

A. The objectives of the firm. Based on the positions of recognized authorities as well as upon intuitive reasoning, an objective of maximizing the wealth of the residual owners (common stockholders) was established as the foundation of conceptual solutions to the problems. Without such a unifying principle, the process of selection is aimless.

B. Risk. Risk was demonstrated to be a factor in the rational investors' determinations of required yield. This factor as introduced by both the nature of the firm (industrial, utility, other) and by financial risk in the form of leverage was shown

to be the single most potent determinant of capital cost. Even if MM's argument for arbitrage were fully accepted, the role of business risk in determining fund source and cost would remain as the existence of homogeneous risk classes has not been conclusively proven.

C. Stability of earnings. The determination of this factor as significant was closely related to the study of business risk, the latter being a measure of earnings stability of the industry. It was shown that both the range and distributions of earnings are critical factors in the selection of fund sources. Empirical evidence supported the theoretical conclusion that firms with inherently stable earnings can better utilize debt than those whose income is subject to wide seasonal or cyclical swings.

D. Regulation. This factor was established in recognition of the role played by government control over franchised monopolies.

E. Stage in the life cycle. New firms have no recourse but to build an equity base before they can attract debt capital under acceptable conditions. Similarly, older firms, having reached a practical limit of debt as far as creditors are considered, may be forced to expand their equity. It was shown also that a firm with limited investment opportunities might sustain its small fund needs through internally generated funds. The stage of the life cycle then controls the availability and the relative attractiveness of alternative sources.

F. Debt capacity. Given the objective of owner wealth maximization, it was demonstrated, through use of Gordon Donaldson's method, that the prudent manager will limit debt to remain within safe limits. Furthermore, a prudent manager will control the use of debt even though lenders may be willing to provide more debt on favorable terms. His assessment of risk, though not necessarily so rationally arrived at as in Donaldson's example, will keep financial risk within some arbitrarily determined corporate standards. It might be inferred from the study that if management did not do so, enlightened lenders would soon increase the tangible and intangible cost of debt beyond attractive limits.

G. Money and capital markets. The fact was established that the availability of funds in the market affect their selection. A current example used in illustration was the existing paucity of debt capital forcing large corporations to plan new equity issues.

Subsidiary question (a). How should the cost of additional capital be determined? Implicit in this question is the evaluation of relative fund source costs. It was discovered during this study that attempts at individual computation of debt costs and equity costs are not the most useful way to approach the problem due to the interdependence of the costs upon each other. The following general method of solution is concluded to be of practical utility:

(a) Determine the current market value of a common share.

(b) Select a tentative fund source (or fund source

strategy) and time horizon and determine the value of a common share at that time, using a valuation formula and/or technique.

(c) Since all formulas and methods for share valuation reviewed in this study incorporate a factor for equity capital cost, the difference between the share values in (a) and (b) may be set equal to the valuation formula and the marginal or incremental cost of equity determined.

(d) Steps (b) and (c) may use any of a number of formulas, such as those of Mao, supra, pages 72 through 74, so long as the assumptions of the formulas reasonably apply to the firm in question and so long as a factor is added for terminal value at the time horizon. Neither the formulas of Mao nor that of RM explicitly include the effect of leverage. This must be accounted for by projecting future cash flows in a manner similar to that described by RM, allowing for risk and uncertainty by certainty equivalent factors or other probability methods. Dividend policies which are to be varied over time may also be accommodated by the cash-flow-simulation technique.

(e) With the effect of debt and retained earnings properly accounted for in the assessment of cash flows, no explicit computation of debt cost need be made; its effect will be included as an imputed cost in the marginal cost of equity capital.

(f) The process of steps (c) and (d) must be repeated for each source alternative or strategy to determine the minimum marginal cost.

Subsidiary question (b). What are the effects of dividend policy upon capital structure? It is concluded, that for a given

firm with a given investment program, dependence upon external funding varies directly, though not necessarily linearly, with pay out ratio. No general conclusion can be reached regarding dividend policy's effect upon the market value of capital structure inasmuch as it was demonstrated in the study that both expected dividend pay out alone or expected growth alone can, under certain circumstances, lead to increased common share valuation. It is further concluded that meaningful statistical study is required to determine how investors evaluate dividend policy in determining required equity yields.

Subsidiary question (c). Is there a definable relationship between capital structure and capital cost? In the absence of corporate tax, the evidence for or against a definable relationship is considered inconclusive. With the existence of a substantial corporate tax on earnings, it is concluded that the use of debt, in moderation, can reduce the cost of capital to a firm. However, no reliable relationship was discovered defining a unique optimal structure even in the presence of tax. From this conclusion, it follows that cost should be included under the factors listing of the basic question.

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